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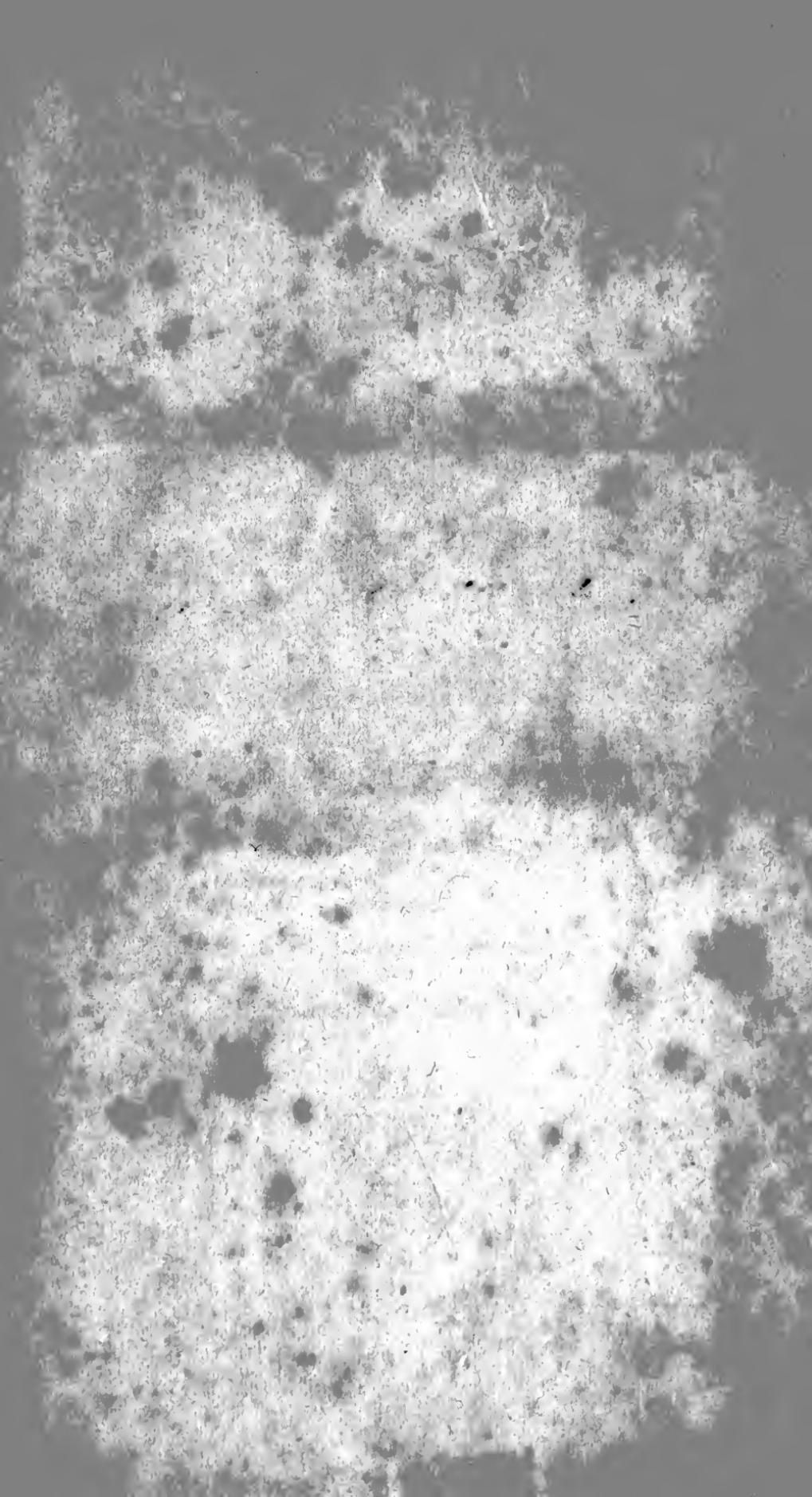
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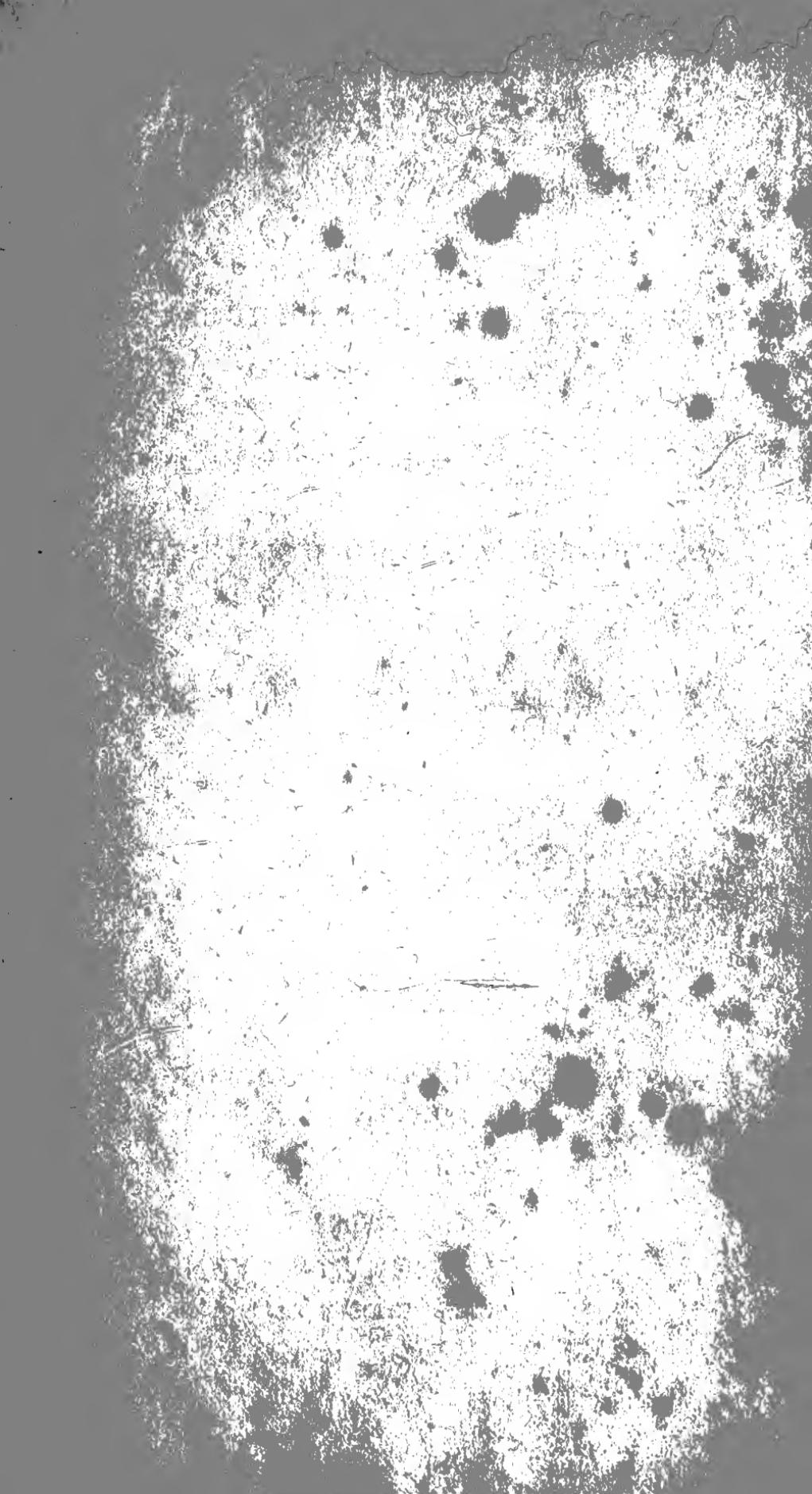
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# OBSERVATIONS

ON

WOUNDS, AND THEIR COMPLICATIONS BY ERYSIPELAS,  
GANGRENE AND TETANUS,

AND ON THE

PRINCIPAL DISEASES AND INJURIES

OF THE

HEAD, EAR AND EYE.

BY THE

BARON D<sup>r</sup>. J<sup>r</sup> LARREY,

LATE SURGEON IN CHIEF TO THE IMPERIAL GRAND ARMY IN RUSSIA, ETC. ETC.

WITH PLATES.

TRANSLATED FROM THE FRENCH BY  
E. F. RIVINUS, M.D.

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## PREFACE OF THE TRANSLATOR.

IN reply to those who, conversant with the writings and literary labours of the Baron Larrey, are desirous to learn when he composed the work before the reader, on the “Diseases and Injuries of the Head,” it is proper to state that it constitutes the first volume of the Baron’s latest work, entitled “Clinique Chirurgicale, Paris, 1829—1830.” Under this unassuming title, the author has embodied in three volumes that immense mass of surgical experience which, during one of the most eventful periods in the history of man, he has had the good fortune to make in four quarters of the globe, under the auspices of one of the most extraordinary personages who ever wielded the destinies of mankind. As the personal friend of Napoleon, he enjoyed the privilege of accompanying him upon all his principal expeditions and campaigns, from the earliest dawn of his effulgent career to his downfall, which our author himself politically survived; being subsequently retained by the ruling powers—a rare tribute paid to genuine merit without distinction of party—as surgeon in chief to the great military hospital of the royal guards. Endowed by nature with uncommon capacities for observation and philosophical induction which had been early developed by the illustrious Sabatier, his preceptor, he improved his superior opportunities with the most becoming spirit of industry

and the most indefatigable devotion to the interests of science and of mankind.

A large portion of the numerous surgical facts collected in his forty years service has already been recorded by him in his "Memoirs" of the campaigns in which he served. These, however, are there related merely in chronological order, loose, incoherent and interspersed with much irrelevant matter of purely historical interest. In the present work, on the contrary, a systematical arrangement of the subject matter has been realized, supported and connected by the author's close and ingenious reasoning. Thus, preceded by some general remarks on wounds and their complications by erysipelas, gangrene and tetanus, the surgical diseases of the head, ear and eye are exclusively treated in the first; those of the face, neck, and trunk in the second; while the subjects of hernia, aneurism, fracture, amputation, &c. &c. are separately discussed in the third volume of the Clinique Chirurgicale. Each volume, therefore, constitutes an independent whole, and considering it in this point of view, the separate publication, under the especial title assigned to it, of the first volume of this highly interesting work, will, it is supposed, require no apology. The great importance of the subject, which is far from being exhausted, the originality of the author's views of the pathology and treatment of several leading surgical diseases of the head, will insure it a respectful consideration, and the evident leaning of the author to the theories of Dr Gall will prove an additional recommendation to some, while it will tend to amuse others.

E. F. RIVINUS.

*Philadelphia, August 1832.*

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## OBSERVATIONS

ON

### WOUNDS, AND ON THE PRINCIPAL DISEASES AND INJURIES OF THE HEAD.

#### *A General View of Wounds, especially of Gun-shot Wounds.*

BEFORE I undertake to collect and methodically to arrange those numerous observations—the results of my researches and labours amongst the numerous surgical diseases which, during the memorable war on the four continents, I have had occasion to treat in the camp, as well as in hospitals, I intend to indulge in a few remarks on the solutions of continuity, by which our limbs are liable to be injured; notwithstanding that these complaints have been before described by the classical writers. I shall more particularly direct my attention to the nature of gun-shot wounds, and to the treatment suited to them. Appealed to by the piercing cries which the feelings of pain extort from the wounded left on the field of battle, attracted by the plaintive voice of the dying, and above all desirous of rendering the rules to be pursued useful to their utmost extent, I never, from the first commencement of the hostilities of that war, dreaded to carry the comforts of my art in the midst of the combatants. It was then that I created those light, itinerant hospitals, which have so much reduced the number of victims to the deadly blows of the fatal sisters; and it was then, also, on the fields of glory and carnage, if I may venture thus to express myself, that I became convinced of the necessity of operating, immediately, upon those whose

limbs had been mutilated or destroyed by projectile weapons. Without the prompt application of this maxim, how many generous defenders would have met the fate of those soldiers who, in previous wars, were not till some time after carried from the field of battle, and even then, only when the hospital wagons, heavy at that time, and more or less encumbered in their movements, had arrived on the spot, in order to pick them up, and to remove them to the hospitals, the only place where operations at all important were performed! They whose wounds would have entitled them to the benefits of these wagons, in a few moments, or in a few hours, after receiving the shot, had already ceased to exist; and as to those who, after the first shock, were found to be still alive, there was then, indeed, sufficient reason to believe that their recovery would be the more certain, as the operations which might be indicated, would not be performed till after the cessation of every unfavourable symptom.

Now, it is from wounds of this nature (for the relief of which they had arrived too late, or which, in consideration of the development of certain symptoms, required great circumspection,) that the surgeons of the last century undertook to justify, in all cases, the propriety of dilatory operations, and had arrived in this respect to the solution of that great problem, so long proposed and agitated by the royal academy of surgery; a problem which, even to this day, is looked upon, by several distinguished members of the profession, in the same light as by that illustrious society. None of these surgeons, however, have been, I venture to say, eye-witnesses of those mutilations, and of those great physical disorders which firearms are apt to produce in the course of obstinate engagements, where every inch of ground, or every broken line of fortification is disputed almost hand to hand. For, although the din of war did resound within the heart of our own capital, yet I may well say that the results of the combats which took place under her walls, would never have compared to those sanguinary battles which dyed the fields of Italy, Egypt, Germany, Poland, Spain and Russia, with human blood. To the circumstance, therefore, of having carried the principles of the former academy into effect, so far as regards the small number

of the defenders of this large city (Paris) whose wounds had rendered several great operations necessary, is it to be ascribed, that their success has not, in general, responded at all to the expectations of our surgeons. Confining myself, for the present, to this observation, I propose to treat this important subject at full length, in the article appropriated to it, and without losing sight of the principles of science, I shall permit experience to speak for herself, the results of which I would especially offer to young military surgeons.

*Of Incised Wounds.*

Wounds are recent solutions of continuity inflicted upon our limbs by some cause or other, which destroy their integrity. If the wound is the result of a very sharp-edged cutting instrument, it requires nothing but a reunion. Supposing, then, that only the skin and the muscles are divided, the first phenomenon presented by such a wound, is the retraction of these parts, which is effected by virtue of their elasticity and contractility. In order to render the reunion accurate, and but little painful to the feelings, it is requisite first to separate the corners of such a wound, and to draw its edges close together. For this purpose the divided and subjoined parts must be put into a state of the most perfect relaxation, while those which are diametrically opposed to, and the antagonists of, the latter, should be stretched to the utmost.

The means to be employed to achieve a reunion consist in aiding the effects of the position of the part, in guarding against its displacement, and in bringing the lips of the wound in close apposition. When the skin only is divided, any force bearing upon it will be sufficient, and this indication will, therefore, be best accomplished by adhesive strips, supported by compress and bandage. And on this occasion I would observe that, after having cleaned the wound, the most simple and most proper plan is to close it, and to let it alone till there is reason to think that it has cicatrized, and this with a view to prevent the air from coming in contact with it, which must always prove injurious, as has been too frequently verified by experience. Agreeably to the same experience, therefore, or to some immemorial tradition, the majority of the savages

of the new and the old world, as well as the Arabians of Egypt, immediately after having received their wounds, cover them up with some kind of taffeta, dipped into a balsam, which they allow to remain on it, till the wound has completely healed, a result which generally is accomplished without further efforts, and within a very short space of time.

In order to unite the divided muscles, and keep them in contact, the employment of such means is required as will bear upon their whole extent, hold them compressed, and retain them constantly in the position in which the wounded part has been placed. The uniting bandage presents these three advantages. It accommodates itself to the shape and situation of the wound, and is particularly adapted to transverse wounds of the limbs.

When the solution of continuity is such that the means just mentioned are insufficient, a more efficacious remedy must be resorted to. This is a suture, which now becomes indispensable, because of the want of support afforded by the parts to the bandage, in consequence either of the extent of the wound, and the impossibility of retaining, by any other means, the edges close together, or in consequence of the constant action and retraction of the parts, all which may happen, for example, in the extensive and longitudinal wounds of the abdomen, in those which divide the tender coverings of the mouth, and other parts of the head, the neck, and the trunk, and in some cases even of a deep, and very extensive division of the muscles of the extremities.

A suture is that kind of surgical operation, which, with the aid of one or more needles, armed with a flat cord of waxed thread, brings the two lips of a wound into immediate contact. In order to give an idea of the nature and shape of the needles, I will briefly refer to my memoir on the subject of these instruments, to which an accessit to the grand prize was awarded by the former royal academy of surgery.

In that memoir I endeavoured to point out, first, the inconveniences of the needles which, till then, had been constantly in use; after which I described those invented by myself, and explained the advantages which they present. They are of fine steel, and good temper; and it is necessary for the sutures

of the different wounds of the abdomen, neck, face, ears and eye-lids, to have large, middle-sized, small, and very small needles. They are curved after the manner of a semicircle, with the extremities parallel to each other. The point has the shape of a small spear or pike, slightly bent, is extremely sharp, and supplied with cutting edges. The edges terminate towards the body of the needle in two rounded angles, forming upon it a projection more or less perceptible, according to the size of the instrument. The body is, throughout its whole extent, of equal breadth and thickness; both its surfaces are polished, and its sides are rounded off, and rather more slender than the centre.

The extremity opposite to the point, or the head, is pierced by a transverse and square opening, which is about two and a half lines distant from this extremity, and is hollowed out by a plain groove, for the purpose of lodging the cord or thread. These needles enter the skin with ease, and make only a simple wound, in which the ligature is free, and preserves that flattened shape which so perfectly secures the lips of the rent. These small wounds, thus produced by the needles, are never accompanied by any unpleasant symptoms, and cicatrize very promptly as soon as the ligature is withdrawn.

By comparing these needles with those formerly and now in use, it will be easy to point out the difference which exists between them, and to appreciate the advantages presented by those which pass, without any difficulty, through the dense and elastic membrane of the skin, where they make only such wounds as resemble those which are occasioned by the lancet.

I have employed these needles a great many times, and always with the greatest facility.\*

The sutures are divided into the interrupted, the quilled or compound, the twisted and the glover's suture. The first is suited to almost every case where a suture is indicated; the se-

\* I have presented also to the same academy another needle for aneurism, which only differs from the former in the point, which is blunt, sufficiently slender and rounded, so as to push it readily through the cellular tissue, without at the same time, being able to prick the nervous cords, or cutting the collateral branches of the artery which is to be secured. The opening, destined to accommodate the little thread, is fixed similarly to that of the suture needle. The ligature needle is only somewhat flexible, that it may describe the circuits more easily, which sometimes it is compelled to make.

cond is chiefly employed in wounds of the abdomen; the twisted is used in the operation for hare-lip, and the others in wounds of the stomach and the intestines.

As soon as the first indications are fulfilled, it will be necessary to aid the exertions which nature makes for the wound, from the first moment to the perfect cicatrization, and which she, by imperceptible agencies, accomplishes in the following manner:

In the first moments, the irritation of the parts establishes a more or less considerable inflammatory action in the thickness of the lips of the wound, by which their volume is increased; this condition is accompanied by some slight pain, tension and heat, which after some time terminates by resolution, or by a purulent or serous discharge. After this the margins subside, the vessels become disengaged, form adhesions, chiefly by inosculation, and establish an intercourse between themselves which is more or less perfect, and admits of the circulation and communication of the fluids of both sides. When there is a loss of substance, the cicatrix is sunk, tender and ready to break or tear, which disproves the theory of the reproduction of the flesh.

In order to encourage nature in her efforts, the patient must be directed to keep the most absolute rest, regimen and diet, and to make use of such topical applications as may be calculated to diminish the inflammation, if that should run very high, assuage the pain, and promote the union of parts. This object is best accomplished by allowing the first dressing to remain as long as possible.

Authors have bestowed the name of *compound* wounds upon such wounds which divide the soft as well as the solid parts. This distinction is entirely useless, for unless the divisions are attended by fracture, splinter or contusion of bone, the indications and the treatment are the same as for simple wounds.

The *complicated* wound, however, is a solution of continuity, accompanied by circumstances more or less serious, which present new indications. These complications may depend upon the causes which produced the wound, upon the

symptoms which accompany it, or upon some other complaint with which the patient has been seized, as erysipelas, phlegmon, &c.

When the whole or a part of the substance, which produced the solution of continuity, has remained in the flesh, it constitutes a complication, known by the name of foreign bodies. Now, in as much as the presence alone of such foreign bodies may develope all the symptoms above alluded to, it is highly necessary to extract them immediately, lest the means which may be requisite for the accomplishment of this object are productive of greater injury to the patient, than the retention in the parts of these foreign bodies themselves.

We do not, at present, mean to dwell upon these different complications, because we shall have occasion to speak of them more at large in the account which we propose to give of gun-shot wounds.

For the present, we will continue our remarks on the solutions of continuity, called after the causes which inflict them; and these are punctured wounds, lacerated wounds, and wounds produced by the bites of rabid, or venomous animals.

### *Punctured Wounds.*

Punctures being the effect of the action of a more or less pointed instrument, differ as to the nature of the instrument which has caused them, and as to the parts which have been injured. They are mostly attended by a higher or lesser degree of local irritation and inflammation, and sometimes by extremely serious nervous symptoms,\* of which we shall have, hereafter, occasion to speak, in the article on stings of certain insects and venomous serpents. Wounds of this nature require the enlargement of the injured parts, the absorption of the effused fluids, a proper degree of compression, and the anti-phlogistic regimen. The enlargement being made, according to circumstances, cupping-glasses may be applied over these wounds with great advantage, the effects of which may be in-

\* Free from this objection, however, are the punctures made by those very fine acupuncturation needles, which are made to pass readily and without pain through the sheaths of the muscular tissue.

creased, moreover, by scarifications more or less deep, as necessity seems to require, and with these, appropriate topical applications may be combined, such as compresses and dressings, soaked in some sedative and discutient lotion.

*Lacerated Wounds.*

Lacerated wounds differ from other solutions of continuity in the shape, the phenomena which they present, and the symptoms by which they are followed. They are commonly very irregular, and present the fragments of the parts separated from one another and more or less retracted, according to the contractility of these parts; the lips of such wounds, formed by the integuments, are usually turgescent and inverted. There is seldom any hemorrhage, because the ruptured arteries curl upon themselves, and because their coats, which speedily become inflamed, form mutual adhesions, and thus prevent a sanguineous evacuation. The pain is sharp and extends far beyond, more particularly along, the course of the nerves, and is frequently accompanied by a vibratory motion of the subjacent parts, and by a certain degree of numbness.

Inflammation, erethismus, convulsive twitches, sometimes tetanus, subsequent accumulations of matter and purulent sinuses,—such are the consequences of these kinds of solutions of continuity, of which fortunately not often, but still too many instances occur.

They may be the result of a limb, or some portion of it being torn off. I have seen many horsemen who have had one or more of their fingers torn off, when, while in the act of watering their horses, they imprudently held them by the very thin reins twisted around their fingers. The horses becoming frightened, and suddenly starting, make an effort upon the reins which hold them back, so rough and violent, that its force overcomes the resistance of the hand of the rider, and that not only the finger is torn off at the strangulated articulation, but even the tendons which are attached to the extremity of this appendix, are separated up to their insertion into the muscular parenchyma.

The first indications to be fulfilled consist in making di-

vergent incisions through the integuments which form the edges of the wounds, through the fibrous sheaths and through the aponeuroses; in cutting out all those disorganized shreds of muscle or tendon which protrude beyond the level of the solution of continuity, and in tying as much as possible all vessels which are visible, as well as those after which search may be made without danger. After this the edges of the wound are to be drawn together, yet without being over anxious about effecting a too speedy union of them; while at the same time equal pressure is to be made over the whole wounded surface by means of a compress, soaked in some sedative and gently tonic lotion; and this dressing is to remain undisturbed as long as possible, without being renewed.

*Of Wounds inflicted by Rabid Animals.*

The wounds produced by rabid animals are unequal and contused solutions of continuity, accompanied by smart pain, and, generally speaking, by all those symptoms which supervene in punctured wounds in which a poisonous substance has been made to enter. Yet before pronouncing upon the state of the animal which has inflicted the wound, it is all important to learn the signs and symptoms by which its madness may be recognized (for which purpose the authors that have professedly written on hydrophobia may be consulted).

The more decisive symptoms which are apt to attack man in this disease, show themselves almost never immediately after the bite; sometimes an interval of thirty to forty days elapses before their appearance; but at other times they come on within the first twenty-four hours. The injury itself presents only the appearance of a simple contused wound, into which almost always a greater or lesser quantity of the saliva of the animal has insinuated itself; and the depravity of this fluid is so great, that to its passage into all parts of the individual must the symptoms be attributed which we are about to describe.

This wound is attended with pain, some degree of numbness in the part, and more or less inflammation: the parts gradually begin to swell; the patient evinces a state of anxiety; the eyes assume a haggard aspect; the tears flow involuntarily; the com-

plexion becomes discoloured; his strength begins to fail him; and his slumbers are disturbed by terrifying dreams; he loses his appetite, retires from society and seeks solitude; he avoids the broad light of day, and shrinks from every kind of drink or fluid; at times he is sorrowful, sinks into some sort of stupor, from which he awakes by starts, and becomes furious in some degree; he experiences an oppression at the heart, a slight difficulty of breathing, twitches in all his limbs, and suffers from a kind of strangulation which is still more increased by the high temperature of the body, headach, occasional vertigo, and more or less violent febrile symptoms which supervene in their turn.

All these symptoms which rapidly increase are soon followed by those which characterize the stage of frenzy: the patient evinces a propensity to rush upon his fellow beings in order to bite them, or he endeavours to strangle them, not, however, without giving previous notice of his intention by doleful screams, or menaces peculiar to the patients. The sight of water makes a disagreeable and fearful impression on him; it is an abomination to him, which manifests itself by convulsed gestures. He experiences the greatest difficulty in swallowing; his saliva flows outward, becomes white and frothy, similar to that of animals: it is at this period that, with the majority of subjects, several bluish vesicles show themselves, which we believe to be peculiar to the partial turgidity of the ranine veins, and the opening of which might be of service to the patient, by abstracting a portion of the blood, with which they are commonly charged. He mechanically carries the hand towards the throat, as if he wished to indicate the seat of his complaint; he refers, indeed, to this point almost all the sufferings which he experiences during its continuance; and it seems as if its primary cause had fixed itself chiefly upon the nerves of the pharynx and larynx, for repeated post mortem examinations have demonstrated to us that these parts are the most affected. The whole system becomes irritated and inflamed; the different organs become totally deranged; the muscles are seized with frightful convulsions; the heat and fever arrive at their greatest height, and the patient perishes under the most

dreadful tortures on the seventh, ninth, or eleventh day, from the appearance of the first symptoms; he rarely survives the thirteenth day.

It is difficult to explain how the virus of madness can lie dormant in our bodies more or less long, subsequently develope itself, and finally terminate under such awful consequences. It would, nevertheless, seem that this virus, which is of a very subtle, but unknown nature, must have a particular affinity for the nerves, and spread itself in preference over the nervous system, where it can remain latent for a greater or lesser space of time, most commonly, as we have already stated, for thirty or forty days. Its effects, as soon as it begins to develope itself, are of a purely nervous nature, which appears to justify this assertion.\* However, in order to prove its correctness,

\* Peter Courmontagne, at. 22, a private of the first regiment of cuirassiers of the royal guards, when fourteen or fifteen years of age, had been bitten by a mad dog in the right thigh, where an irregular cicatrix was still perceptible: the animal had died of the disease.

Ever since that period, Courmontagne has never ceased to be afflicted with a kind of nervous affection, accompanied with spasms and a transient aberration of his mental faculties, to such a degree, that from the time of his entering the military service, his comrades endeavoured to shun his society, and he was changed twice from the regiment. He was irascible, and became frequently agitated by automatic movements; in his conversation he was observed to be blustering and incoherent. He was meagre; his eyes looked haggard; he was frequently seized with vertigo and dimness of sight; his complexion became ruddy, and his pulse was almost always vibrating and hard. He has always felt an aversion for pure and clear water, for which he never showed the least desire, not even under circumstances, when his fellow soldiers, tormented as they were by the heat of the day, used to regale themselves with it in his presence. Yet would he drink with moré or less avidity bitter decoctions, or any other dark and high coloured beverages.

Such was his condition, when on May 29, 1821, he was brought to the Hospital of the Royal Guards for a sprain of his right foot, contracted during the violent exercises on horseback. Soon after, symptoms of nostalgia began to show themselves in conjunction with his general and habitual uneasiness, and Courmontagne declared loudly his wish to be discharged. With that intention, and far from allowing himself to be cured, he secretly employed a ligature; and an unfavourable position for the limb, in order to stop the circulation. In consequence of which a gangrenous spot made its appearance near the anterior part of the foot, which increased most rapidly, and, finally, the entire member becoming sphacelated throughout, rendered its amputation indispensable.

After several paroxysms of traumatic irritation, which had been momentarily augmented by digressions from the prescribed regimen, the wound had already

we will give a summary account of the experiments of the celebrated Rossi, professor of the university of Turin.

These experiments consist in making an incision into some fleshy part of a healthy and vigorous animal, and in enclosing within that incision a portion of nerve, taken at the same time

passed through all its stages, and cicatrized nearly two-thirds of its size, when, on the thirtieth day after the operation, the patient suddenly manifested a marked aversion for all sorts of transparent fluids, and evinced signs of an increase of spasms and of cerebral inflammation. He was attacked with convulsions, locked jaws, and grinding of the teeth, and actually fell into a state of tetanic contraction. All excretions were suppressed, the spasms and the rigidity assumed a double intensity, and the soldier expired in the night of the thirty-second or thirty-third day.

As during life-time every circumstance had justified the presumption that the disease must have existed in the brain, the autopsy of the body was therefore commenced with that cavity. Behold, then, the numerous derangements which were there encountered: hypertrophy of the cranium, chiefly of the occipital region; considerable engorgement of the meningeal and cerebral vessels, as well as of the superior longitudinal sinus and plexus choroides; slight granulations at the periphery of the hemispheres; about one ounce of a yellowish serum in the lateral ventricles; hardness and compactness of the substance of the brain throughout, of the medulla oblongata, and more especially of the annular protuberance, in the substance of which a reddish tint was observed, which was equally obvious in the thalamus of the optic nerves; the neurileme of most all the nerves of the medulla oblongata, near their origin, participated of that same reddish and inflammatory complexion.

The air passages which we carefully examined, and the mucous membrane of the alimentary canal had nothing to offer us for pathological observation; the lungs, with the exception of some pretty old adhesions, and all the abdominal viscera, were found in their natural condition. The liver alone had increased somewhat in volume, and was in a hypertrophic state. But to our great surprise we found not the slightest vestige of inflammation in the pericardium; it had formed a close, though doubtless very old adhesion with the entire periphery of the heart or its capsular membrane, with which the first mentioned sero-fibrous coat was completely amalgamated. The cavities of the heart were greatly contracted, and the principal vessels which derive their origin from that organ had nearly lost a third of their diameter.

The wound of the stump, now almost entirely cicatrized, exhibited nothing uncommon.

After this exposition, it is evident that the symptoms and occurrences, as they appeared in the subject of this notice, must have belonged, no doubt, to the hydrophobic virus having been inoculated by the bite of the rabid animal, which died of this disease a few hours afterwards; and it is, moreover, clear that this virus, without occasioning any violent fits, has remained dormant in the system up to the period when the exciting causes, of which we have spoken, seemed to have developed its effects. Every thing appears also to prove that it had been concentrated in the cerebral and nervous systems.

from another animal which had been seized with madness and one of its most violent fits. At periods which are fixed by nature, the former becomes likewise enraged, and dies of the same train of events.

There is yet another difficult question to determine, whether the hydrophobic virus is susceptible of being communicated from one individual to another through the agency of an excrementitious fluid, or from the mother to her infant by means of the circulation. The reasoning of writers upon this subject has not as yet resulted in any thing satisfactory, and our experience has not been sufficiently extensive to permit us to decide.

Of all animals, wolves, dogs, and cats are most subject to hydrophobia; man rarely falls into those fits which it is apt to occasion, unless the virus has been communicated to him. Its predisposing causes, with the animals just mentioned, would seem to be the heat of the climate, the use of salted food, great fatigue and thirst; but, above all, the amorous heat which sways these animals for a long time, and almost always without taking food or drink.

The exciting causes are toothach, a swelling of the maxillary glands, brought on in the usual way by the sudden change from heat to cold, or some derangement of the organs of deglutition, caused by the presence of a fragment of fish-bone, or any other piece of more or less sharp-pointed bone, which has become fixed there and irritates these parts.

Rabid dogs are more frequently met with in hot than in temperate climates; and if the hydrophobia never, or but very rarely, has been observed in Egypt, it is to be accounted for by the peculiar character of the animals and their habits of life: through the day they lie quiet in the shade, in the water or close by the vessels which are filled with it, and which the Egyptians keep for their use, and take care to replenish every day. They run about only at night, and evince the symptoms and the effects of the amorous heat at very distant intervals, and then during a few moments only; they are seldom seen in the act of coition; yet if there exist so large a number of these animals in the different parts of Egypt,

it is because none of them are killed, and because they live altogether in the streets, without ever entering the houses.

The prognosis in hydrophobia is, generally speaking, most melancholy. For, as soon as the symptoms have developed themselves, human art has scarcely any remedies at all to offer; and the man who has become its victim, is in some measure condemned to perish, unless nature, by means of unforeseen circumstances, should establish a favourable crisis, as in a few instances this has actually been the case.

Owing to prejudice and usage, various remedies have been employed with a view promptly to terminate the sufferings and the life of the unhappy hydrophobic patient. Whilst some have directed four of his veins to be opened at once, others have endeavoured to suffocate him; and again others have caused him to be stung by venomous animals, such as the viper, under an impression that the virus of this reptile must neutralize that of madness. All these proceedings, however, opposed as they are to the principles of art and humanity, derive their origin from the grossest barbarity, and cannot, under any circumstance, be employed again. If the exhibition of suitable remedies should be impossible, the patient must be abandoned entirely to the resources of nature, taking care only to prevent his doing mischief to any of his fellow beings.

If there be yet time, however, to afford relief to persons bitten by a rabid animal, the appropriate remedies must be employed in the promptest manner possible. The indication which has appeared to us the most simple, is to prevent the introduction of the venomous substance into the internal organs of the body, and to defeat the consequences of these contused and lacerated wounds. In order to effect this, the solution of continuity must be immediately enlarged, one or more cupping-glasses applied over it, so as to absorb the fluids from the opened vessels, which may have become saturated with the poison, and to cauterize it afterwards by employing either the actual cautery or the caustic potash. It will then be prudent to promote the effect of these topical applications, by the use of such other remedies as have met with the most success; for example, the gum ammoniac combined with some bitter

vegetable infusion; the narcotics and anti-spasmodics, such as camphor, opium in substance; which should be preceded by general blood-letting and scarified cupping over both sides of the spine and epigastrium, to which parts, moreover, daily embrocations of camphorated oil of chamomile may be applied. With the aid of the above remedies, employed at the very threshold, to be sure, of an attack of the hydrophobic symptoms, we have had the good fortune to treat a merchant in Paris, of thirty-five or thirty-six years of age, and to restore him to perfect health. This individual, whom we have repeatedly seen since that occurrence, is doing quite well, and appears to have completely regained his natural cheerfulness.

Mercurial frictions have been recommended likewise with some show of reason. I have employed them in several cases as a preservative remedy, and have directed them to be applied, at intervals of from five to six days, to the soles of the feet and to the inside of the legs.

There have been persons who, believing themselves to have been bitten by rabid animals, which indeed they had not, have yet been attacked with symptoms of hydrophobia, and perished in consequence. This is easily understood, when we consider the analogy which exists between the consequences of a nervous affection, the result of violent passions of the mind, and those which are caused by madness, and which is the same that happens so frequently to over-delicate and irritable women, in consequence of their confinement, or hysterical vapours. We have even seen tetanus complicated with the very same nervous paroxysms, of which we intend to speak in the article devoted to that complaint.

I moreover believe, supposing that the hydrophobic symptoms had already broken out, and supposing that the patient could be secured without inconvenience, by covering his eyes with a bandage, after having separated and securely fixed his jaws, I believe it to be possible that he could be made to swallow liquids which, given in a proper dose, should exert a sedative and anti-spasmodic effect. By this means, the spasm and the irritation might possibly be overcome, under which the nervous system of the throat and all the muscular parts of the

air and alimentary passages labour, and which is one of the principal causes of death. The operation of these remedies might next be promoted by the application of the actual cautery to the injured parts, however much they might have cicatrized, or to any other spots distant from the centre of vitality. The sudden and instantaneous immersion of the entire body of the patient into cold water, the application of ice over the irritated parts, by which the general blood-letting and the cupping-glasses, placed abundantly over the regions above designated, should be preceded; all these means will be very proper to cause a suspension of the terrible paroxysms of this disease. Experience must prove their efficacy. They who are engaged in making these experiments ought to take the utmost precaution against receiving upon their mucous surfaces, and especially upon wounds or recent cicatrices, the smallest particle of saliva which the patient frequently emits, for it is maintained that such an emission is sufficient to communicate the hydrophobia,

#### *Of Poisoned Wounds.*

Poisoned wounds consist in very small injuries, similar to punctures, which are succeeded, however, by an immediate swelling, not observed in the first instance in the other solutions of continuity. They differ, according to the animals which produce them. These animals are of two kinds, reptiles and insects.

Among the reptiles, nearly all the snakes and serpents may, more particularly in hot countries, be looked upon as venomous animals. In temperate climates, there is, properly speaking, none but the viper. Among the insects, the scorpion, wasp, bee, mosquito, &c. rank as such. Their sting is decidedly venomous to a certain degree, especially in hot climates. Most of these insects pierce through the skin with the aid of a short pointed trunk, from which a few particles of a peculiar fluid ooze, which is more or less acrid and capable of irritating the parts.

The symptoms which these punctures exhibit, differ from those which accompany the bites of reptiles. The sting of

these insects announces itself forthwith by a troublesome itching sensation; the cutaneous tissue instantly becomes bloated within a very small circle, and circumscribed form; the pruritus continues to increase during the first twenty-four hours, but finally terminates in a slightly inflamed spot. Beside these phenomena, the sting of the scorpion is mostly attended by a feeling of numbness in the wounded part, and which in some instances extends over the entire structure of the limb; the swelling spreads further of its own accord, and changes the colour of the skin to a bluish appearance.

These stings, when left to themselves, have, generally speaking, no unpleasant consequences. The public prints, however, have not long since related the account of a postilion who, with his horses, perished in consequence of the numberless stings received from a swarm of bees, which he met on his passage through a forest, during an exceedingly warm night in summer. I have, likewise, had occasion to observe at Newfoundland, that the stings of the mosquitos of that climate produced upon the skin a general emphysema, followed by some degree of feverish excitement.

Among the great number of persons who, during our sojourn at Alexandria, had been stung by scorpions, only one individual was seized with the symptoms which writers ascribe to the sting of the tarantula. The spot of this wound (it was the middle finger) presented a slight swelling; the hand and arm were benumbed; the patient was in a state of the utmost dejection; he shed tears and sighed frequently; he had lost his sleep and appetite; he experienced rigors of terror, and had unpleasant dreams. The unexpected approach of several persons occasioned him some slight convulsions. In this condition he had been for forty-eight hours, before I could see him. The application to the finger of a little volatile alkali; the internal use of it to the amount of eight drops in a glass of the infusion of chamomile; exercise, rides, and sea-bathing, quieted all these symptoms. On the third day this soldier returned to his corps completely recovered.

The more efficacious remedies for such wounds, are the immediate application of some corrosive or highly tonic substance,

and the administration of cordials internally. Amongst these are ammoniac, muriate of ammonia dissolved in water, urine, vinegar, muriate of soda, nitric acid, or any other analogous substance; the application of a very small piece of burning charcoal, a small portion of clay, or a little lime dissolved in water, or the combustion of a few grains of powder are sufficient instantly to destroy their effects. And if the sting has occasioned a slight derangement of the system, a little brandy, coffee, or some vulnerary balsam, will completely assist the topical applications and restore the patient.

I shall not dwell upon the effects of the sting of the tarantula and all the other spiders, which in my opinion does not differ essentially from that of other insects. My experience at least has not taught me anything more in this respect.

With respect to the bites inflicted by reptiles, the most dangerous are those of the viper and the rattle-snake, the latter of which announces its approach by the sound of its rattles. This kind of wound is immediately attended with a most lively pain and a sensation of numbness in the part, which forthwith begins to swell. The swelling increases rapidly and becomes the seat of bluish and gangrenous vesications. The pain and stiffness spread from one place to another, and finally involve the whole limb. The intumescence extends over all parts of the body and carries its principal effects into the cavity of the abdomen; the liver becomes engorged; the bile is forced out of its channels, re-enters the volume of the circulation, and is the cause of jaundice.

These preliminary symptoms frighten the patient; he experiences headache, vertigo, difficulty of breathing, syncope; the circulation becomes disordered, the pulse is small, and the extremities grow cold. Within the first twenty-four hours vomiting supervenes, succeeded by convulsive motions and a burning heat in the intestines; the powers of motion and feeling become gradually extinct; the swelling increases; a lethargic drowsiness comes on, which is only interrupted by convulsive motions or by raving madness; hemorrhages from the anus, nose and mouth take place, and the patient perishes on the third or fifth day, with all the symptoms of a putrid ma-

lignant fever. If he survives the third day, nature, by renewed efforts, brings on a crisis, and may possibly, though indeed very slowly, shake off the disease. The most favourable and most common sign of such a crisis is a very copious perspiration, which makes its appearance on the third, fifth, or at latest, on the seventh day from the first attack of the symptoms, which, however, do not always present the same degree of intensity. For instance, if the viper had to strike through coarse woollen cloths, or if he has previously bitten other subjects, his poison is then less active, and will also be less powerful during the colder seasons, more particularly if he is young and had not at all been irritated before.

It is difficult to explain the modus operandi of this particular poison in the parts of the living animal, and its agency in the production of all the above phenomena. Besides, the subtle qualities which it must possess, it has doubtless that of stupefying the nervous principle, by determining a peculiar irritability to the muscular system, and by diluting the fluids so as to separate the aggregating particles. Nature fortunately exerts herself continually to prevent the disorganization of these fluids.

In general, the prognosis in these bites is most unfavourable; it varies, however, according to the situation of the wound, its depth, the nature of the poison, the greater or less agitation of the mind, the temperament of the subject, the climate, &c. The gloomy occurrence may upon this occasion be remembered, which happened at Rouen, to the keeper of one of these reptiles (a rattle-snake), imported into France from America. The effects of the unexpected bite, which this animal inflicted upon the finger of the keeper, were so rapid, that in spite of the most strenuous efforts made by the physicians of the district, the patient died in the space of a few hours, after exhibiting all the symptoms which we have enumerated. Nevertheless, we venture to believe, that if immediately after the bite he had received the assistance which we shall mention below, the fatal operation of that poisonous contagion might have been arrested.

The indication presented by these solutions of continuity, is

to neutralize the virus, either by causing it to be absorbed, or by sucking it out, by which its diffusion and passage into the animal economy will, of course, be prevented. The method to be employed for its fulfilment, consists in making incisions of various kinds, if necessary, and cauterizing them more or less actively; but the most efficacious method in our opinion, and which, in my lessons on clinical surgery, I have demonstrated, long before Doctor Barry in his memoirs had spoken of it, consists in the forcible and repeated application of the piston-cups as often as the depth of the wound may require it. In all other respects the treatment is to be conducted on the same plan as that of a wound caused by some rabid animal.

#### *Of Gun-shot Wounds.*

The study and the investigation of gun-shot wounds presents to the young practitioner, desirous to inform himself, a long series of fortunate occurrences which astonish him, and a mass of dreadful accidents which frighten him. Not unlike the thunderbolts of heaven, the instruments of war also perform their miracles; they wound the parts of the body, and in the midst of their substance work injuries, the extent of which the man of science would not always be capable of ascertaining, were it not for the circuitous routes which the balls are compelled to make in their passage through the living and more or less elastic tissues. These projectiles lacerate the soft parts, shatter the bones, penetrate into the cavities, and, to a certain extent, disorganize the viscera which support life. It is difficult, therefore, to give a short and accurate definition of this kind of solution of continuity, owing to the different phenomena which these injuries exhibit.

The causes which produce them are bodies propelled by gun powder from engines of an infinite variety of construction and names, which are destined to throw bombs, howitzers, bullets, balls or shot. All the bodies thrown in this manner travel, in general, with exceeding rapidity, and reach their destination nearly as soon as the light, and far more expeditiously than the sound, so that the shot is received before the explosion is heard. The power of motion and the celerity of the

bodies are in proportion to the engines which propel them. Their direction is such that the diagonal drawn from the point of departure to the point of their fall, and the parabola which they describe, are so much the greater in proportion to the extent of the space over which they travel. This phenomenon is owing to two principal causes; first, on account of the resistance which the ball meets with on the part of the air; and, secondly, on account of the earth's power of attraction. Fluid masses exert that resistance even to a higher degree than the atmospheric air. Spheric or rounded bodies, such as ball and bullet, at the end of their course revolve upon themselves, or, in other words, upon their axis, and can for some time keep themselves in their curvilinear motion. The consequence of which is, that as soon as they meet at this distance any body of equal form, they pass nearly over its entire periphery, and of course must produce effects different from those which take place when they encounter it at the very outset of their career, and in their original direction.

Bombs, howitzers, and grenades, are spherical bodies of iron, hollow inside, and filled with powder, the explosion of which bursts their parietes, and reduces them to pieces, differing in shape and size, and presenting, most always, irregular cutting edges with angles of more or less sharpness. The balls are of two kinds, either two and two united by a bar of the same metal, which has procured for them the name of bar-shot (boulets ramés), and are employed in the naval service; or simple spherical bodies, entire in their circumference. The balls are also of different calibres, varying in weight from half a pound to forty-eight and upwards. This number is even with some nations, uneven with others. The bullets are likewise of different calibres; the largest bear the name of biscaians, and are commonly made of iron. The musket and pistol balls are made of lead. Amongst all European nations they are plain and uniform; but the Mamelucks and the Arabians, as I have had opportunity to observe, force an iron wire, of more or less thickness, through them, which converts them into chain-shot, or they leave attached to them the pedicel which they have acquired in the bullet-mould. It is wor-

thy of remark, that with a view doubtless to economize that metallic substance, or in order to render these bullets still more destructive, they combine with the lead divers other bodies, such as stones, iron or copper, which, as I have frequently noticed, have a tendency to separate in our parts. Several of them I have found surrounded with a glutinous substance, with which it is likely they had combined corrosive materials which I have not been able to distinguish. These substances disappear as soon as they are discharged from the canon's mouth, and cannot in any way change the nature of these projectiles.

Such foreign bodies may carry before or after them other substances, different in shape and character, such as portions of clothes, leather, armour, some piece of money, wad, &c. When they are driven with force and strike our parts in their original direction at no great distance from the point of their departure, they perforate them, lacerate them, and carry them off in part or entirely. If, on the contrary, they are near the termination of their career, they revolve upon their own rotund surface without changing the extremely elastic tegumentous or membranous coverings, which yield to their impulse, while the adjacent compact or fragile parts are ruptured, lacerated or broken. To these circumstances must the cause of so many sudden deaths be referred, which for so long a time have been attributed to the pressure of the air upon the sensible parts, thus feebly displaced and agitated by the ball. It is sufficient to read the memoir of Levacher, printed in the Transactions of the Ancient Royal Academy of Surgery, in order to be convinced of this mistake, without necessarily appealing to experience, the results of which are already too well known.

In the first case, and supposing it to be a ball of large calibre, which has occasioned the solution of continuity, it will carry away and unequally cut off the limb. If it strikes only the fleshy part of its thickness, this alone is torn off, leaving the bones denuded. Sometimes the strong resistance, made by these bones, prevents the complete section of the soft parts, and the separation of the limb. In that case these parts are extensively bruised and mangled. But supposing it to be a ball of whatsoever calibre, which at the commencement of its career

and with all its original force strikes the centre or the thickness of a member, it passes through by the shortest route, provided that it shall not meet with any obstacles which turn it off from its direction. The entry of this ball is much smaller than its volume; its margins being slightly inverted or depressed inwards. The lips of the wound which are made by its outward passage, are, on the contrary, everted, jaggy, and more freely separated, which give them a larger diameter than that of the lips of the wound made by its entry. As soon, however, as it meets with any obstacles in its way, the ball changes both its form and direction, and makes several turnings and windings, in such a manner that it may strike some more or less distant point from its entrance, and become lodged in either the most elevated or the most oblique part of the limb, so as to run over several regions. Its career is usually arrested at the articulations, at the attachments of the tendons, the aponeuroses, or by any bony protuberances. In general, it follows the course of the nerves and blood-vessels. It may separate also into several fragments which become successively loosened one by one, and take different routes. As soon as the balls have reached the end of their career, they operate upon our parts in the same manner as bullets, and on a smaller scale produce the same results.

The bursting of bombs, of howitzers, or the fragments of stones thrown by pedereros, pursue nearly the same direction, but give rise to modifications, according to the nature and shape of the injuries which they produce. They are less circumscribed, the parts are less disorganized, and of a less blackish appearance; they are, moreover, almost always accompanied by hemorrhage, and in their shape resemble generally the wounds caused by cutting instruments.

The temperature of missiles thrown by gunpowder is never changed like that of the bursting of bombs and howitzers, which, between two different times, are found to be in contact with fire. The pathological observations and the experience made upon that subject, place it now-a-days beyond all doubt that these bodies do not cauterize, as it has been believed by older writers. Our own illustrious Ambrose Paré has this

subject sufficiently explained, so that I shall forbear dwelling upon it.

The friction which the projectiles experience within the tube of the weapon which has thrown them, as well as that to which they are liable from the action of the air or other bodies which they meet, before coming in contact with our parts, equally destroys the various substances which could have been applied to their exterior, and which might have carried with them any poisonous principles. Supposing even that these could have been combined with the metals at the moment of the process of casting, all that is found liberated is afterwards volatilized, and the remainder would become identified with the component molecules of these metals in such a manner as to lose its power of acting upon our organs. There is consequently no cause for apprehension that the various projectiles which may be employed should be capable of causing the effects of poison.

We shall now proceed to the description of the general and local phenomena which these foreign bodies produce upon the parts struck by them; after which our attention shall be directed to the numerous and manifold symptoms which may be the result of the solutions of continuity which they induce.

It is, generally speaking, natural to believe that the irritation and the degree of stupor which take place after a gun-shot wound, should be in a ratio with the force of the body inflicting the wound, and that, consequently, this stupor should be in proportion to the amount of activity with which the projectile body may have been endowed by the peculiar structure of the weapon, and the form of the body which may have been thrown from it. It is not less reasonable to believe that the greater the resistance is which the injured parts may have opposed to the impelling force of this body, the more serious will be the symptoms. We have, therefore, to consider these symptoms first in relation to the local effects produced by projectiles, as well as to those which they induce upon the surrounding parts; and secondly, in relation to the greater or less degree of injury which they frequently inflict upon the integrity of vital organs.

The phenomena which are restricted to the organs originally injured, are the lesion of the integuments, muscles, and blood-vessels; the more or less extensive laceration and attrition of the soft parts to a proportionate length, and in a form analogous to that of the projectile itself, and presenting, moreover, a blackish eschar of a thickness proportionate to the force of action of the offending body. This eschar presents the same phenomena as a burn or the actual cautery, although there is, as we have already remarked, nothing of a caustic nature in the projectiles propelled by gunpowder. The surrounding or subjacent parts of the wound which have escaped the immediate contact of the body in motion, begin to swell and become engorged, the extremities of the ruptured blood-vessels curl up and retract upon themselves in such a manner that there is but very little or no hemorrhage, at any rate, not in the first moments after the accident; it may, however, occur, even to a fatal extent, if some large vessels have not been completely ruptured, that is to say, if the continuity has been preserved in some parts of their coats. Hemorrhages of this character, in a very few hours or minutes, destroy a great number of soldiers left on the field of battle, after having received wounds which are combined with loss of substance in the soft parts and with extensive laceration.\*

Nervous cords are torn, tendons or aponeuroses are lacerated and occasionally pulled from their attachments to their motor fibres, or to the bones themselves; the latter will be fractured or shattered to pieces, the articulations are injured or laid open with or without destruction of substance; all these are circumstances which present as many varieties or particular complications upon which we propose successively to dwell.

*Of the Complication of Wounds. Of Ecchymosis.*

An ecchymosis is the infiltration or effusion of bloody fluids

\* In establishing the flying ambulances, the principal object I had in view was in the promptest possible manner to procure for those grievously wounded soldiers not only the necessary assistance to prevent the fatal effects of these hemorrhages, but also the means of their being taken up and carried afterwards to the ambulances of the first line, where the important operations were performed.

into the cellular and dermoid tissue, or between this membrane and the epidermis. It takes place in consequence of some ruptured blood-vessel, more or less deeply situated, of either the arterial or venous system; but more frequently the latter circulating system, by means of its injection and some kind of absorption, spreads this ecchymosis to more or less remote distances. These aberrations in the circulation of the sanguineous fluids are characterized by a deeper or lighter shade of a blackish or marbled aspect of the skin, by the absence or diminution of the latent heat, by intumescence of the parts, and by the more or less decided loss of sensibility. They are more distinct, and far more readily developed underneath any such portions of the dermoid membrane, the texture of which is loose and very thin, such as the skin of the eyelids and face, the integuments of the organs of generation, &c.

There are circumstances, when there is no ecchymosis, though the contusion be violent and extensive; this happens when the blood-vessels which, from the interior organs run towards the skin, have been ruptured beneath that covering, whereby the circulation is stopped; the same occurs frequently after contusions of the limbs or the trunk caused by a bullet, after it has arrived at the termination of its career. (This will be noticed in its place.)

The enlargement of the wounds which are attended by ecchymosis is sometimes sufficient to disperse this symptom, the entire removal of which may subsequently be accomplished by compression and the employment of repellent applications. Where, however, an ecchymosis should not be accompanied by an external solution of continuity, scarified cups, which draw off the extravasated fluid and promptly disgorge the ecchymosed parts, must be resorted to, which, in like manner, may be followed up by compression and the use of any such substances as are calculated to promote resolution.

#### *Of Traumatic Fever.*

If the local symptoms are intense, which depends upon the nature of the injured parts and the extent of the wound, a traumatic fever will not fail to become developed; the irri-

tation spreads gradually further, and concentrates its effects upon the internal organs which are already predisposed to inflammation and engorgement, after the shock and disturbance which they have received at the moment of the injury; and these organs are principally the liver, the lungs, and the brain. Their functions are disturbed or suspended, and after some degree of stupor, during which there is a stagnation of the fluids which pass through the organic vessels of these viscera, a reaction supervenes, and along with it the whole train of traumatic fever which is ushered in by nervous agitation and slight shivering, small pulse, great anxiety, suppression of all the mucous secretions, as well as of the process of suppuration in the wound which now assumes an unfavourable aspect. These precursory symptoms may in like manner prove to be sometimes the forerunners of the hospital gangrene, sometimes those of gangrene.

To these first symptoms succeed, immediately afterwards, heat, an increase of pulse, burning thirst, dryness of the skin, redness and sympathetic pains felt in different parts of the body, according to the morbid predisposition of the organs. In this way may we account for the formation of abscesses of the liver, the phlegmasia of the lungs, the serous or purulent effusions within the chest, subsequent disorders which, after being converted into primary diseases, may occasion the death of the subject, although the symptoms have originated with the wound.

The original symptoms produce different results. Excessive hemorrhages will cause the death of the wounded with more or less expedition; or if not overcome by them immediately, they throw them into an adynamic state, the fatal consequences of which are prevented with great difficulty.

*Injuries of the Nerves.*

The laceration of the nerves almost invariably induces nervous disorders, which are confined to the injured portions, or are communicated to the whole system as far as the spinal marrow exclusive; for it is a rare event to see this irritation extend itself to the brain. These nervous disorders are distinguished

by more or less intense pain, according to the particular nature of the injured nervous cords. The painful sensation occasioned by the lesion of the nerves of relation is infinitely more quick and acute than that which results from the lesion of nerves of organic life. This latter pain is accompanied with a feeling of local chilliness and painful anxiety. In such cases the increase of sensibility renders the wound susceptible of hospital gangrene, which is to be well distinguished from gangrene, whose cause is, on the contrary, the complete attrition of the tissues.

The forcible separation of the tendons or of fleshy masses is attended by very great contraction, by effusion of the fluids within the lamellated texture or the interstices of the muscles, by an inflammatory engorgement, by erethismus frequently and sphacelus. We shall have occasion to speak of all these complications.

#### *Of Foreign Bodies.*

Gun-shot wounds are finally complicated by the presence, in the living tissues, of the foreign bodies which did produce them. These bodies vary indefinitely in their form, nature, size, and in their manner of being lodged with the parts upon which they rest, or with which they are in contact. Their search is an extremely delicate matter which we can only be so far justified to undertake as it may not prove injurious to the integrity of the parts or the organic functions. If in the first moments they cannot be extracted with ease and without any more serious inconvenience, it must be left to nature to point out to art the best method to be pursued of facilitating their extraction.

In all cases it is proper to attempt to search for these extraneous bodies (projectiles for instance) in the shortest and least dangerous way. For that purpose it will be necessary to enlarge the orifice of the wounds which allow their passage, or rather to make counter-openings if practicable, in order to extract them with greater ease. Such as have become embedded into the bones or within their interstices cannot, unless they are very superficial, be extracted without great inconvenience by means of such mechanical instruments, as the more or less

complicated bullet screws of the ancients, or the rather more perfect ones of the modern practice, and this from two principal reasons:

1. If the bullet has become wedged into the bones, it is difficult, if not impossible altogether, to insinuate the blades of this instrument between the bones and the projectile, without cutting off those portions which are in contact with them, and tearing them off violently, proceedings always hurtful and more or less dangerous; therefore I hold that all these instruments, however ingeniously contrived, are useless. On the contrary, it is much better to permit nature to pursue her own course of outlet, and to wait until she has detached the embedded projectile and brought it beneath the integuments, or within the periphery of the body, from whence its subsequent extraction will be equally expeditious and easy.

2. In those cases, however, where foreign bodies are accessible to the action of the bullet-screws, and besides, sufficiently loose to be extracted without difficulty, it will always be more advantageous to use a simple dressing—or polypus forceps.

The fragments of arrows or javelins buried in the parts of the wounded at a greater or less depth, must be extracted with great precaution, so as not to increase thereby the laceration already existing; and as the darts of these arms have a more or less angular base, they must not be suffered to pass out the same way by which they entered. They should be extracted, as far as it is possible, on the side opposite to their entrance, and in the direction of the point of these weapons, by making for this purpose such incisions as shall be calculated to isolate them and lay them bare. After which they should be immediately taken away with a pair of forceps or a suitable tenaculum; and their extraction is the more easily accomplished as they are not embedded into the bones, and as the shaft of these weapons, if they should have one, could previously be cut off either with a saw or a cutting forceps (*tenaille incisive*). I have had occasion to dress several soldiers of the ex-guards, who had been wounded in the battle of Eylau by the arrows of the Calmucs, in which instances we have put the above principles into practice.

As regards penetrating wounds which may be complicated by the presence of extraneous bodies, in as much as they present as many particular indications as these bodies present varieties of situation, substance and form, we shall be enabled to do justice to all these considerations in each paragraph devoted to these wounds.

In order to conclude our remarks on the complication with which we have been occupied, it remains yet to speak of the curious effects which sometimes supervene at the instance of the presence or absence of the projectiles or fragments of projectiles buried within our parts. Every army-surgeon, for example, knows very well that a simple wound of a limb occasioned by a shot, does not always amount to proof positive that the bullet remains within the substance of the parts. He knows likewise that several different causes may determine it to come out again by the same way, whatever may be its extent or direction; but authors, unacquainted with the nature of these causes and their modus operandi, do not give any explanation of this subject, and do not by any means agree in the views which they take of it. Some have thought that the bullet, after having penetrated deeply into the thickness of a limb, can rebound outwards, after it has skipped over tendons, aponeuroses and bones. Others have come to the conclusion that the muscular contraction was frequently sufficient to repel a projectile and force it out again. The animal economy as well as experience abundantly demonstrate the error of these opinions, whilst we shall endeavour to remind the young practitioner that—

1. The lead, being nearly destitute of all elasticity, is no ways capable of rebounding from the parts which it strikes, whatever may be their density and however feeble may be the stroke of the projectile against the parts. The bullet becomes entirely or partially flattened, is cut in two or more pieces, and is as plastic as the density of the obstacles which it breaks through will admit of; meanwhile the parts which have been struck by it undergo in their turn a corresponding alteration. If these consist of solid masses, they are perforated, notched, fractured or shattered to pieces; the bullet or its

fragments bury themselves in the substance of the splinters, in the spongy part of the bones, or in the medullary cavity.

2. The motor fibre struck by the bullet is instantly benumbed and deprived of its power of contraction; at other times, however trifling the shock may be, this fibre is contused, lacerated, and the bullet becomes lost in the substance of the muscle, or turns but very little out of its direction, and even if it should make a few more or less remote windings, it will only be owing to the little resistance which it meets with in the cellular tissue, accompanying the blood-vessels or nerves.

How then can we explain this repulsion which the bullet experiences, so that after having more or less deeply penetrated, it passes out again by that wound which by entering it inflicted?

Be the depth of the passage which this projectile shall have made into the soft parts, ever so short, it will not pass out again by the same route, unless (as Ambrose Paré has judiciously observed) it be drawn or dragged out by some portions of clothing which have been pushed and introduced before it into the parts. It frequently happens, indeed, when the passage is short that the cartridge in which the bullet is enclosed, is carried outwards by the change of position or the movements of the wounded, in such a manner that this foreign body, after having made its way into the flesh, falls to the ground or stays in the habiliments of the individual. In the supposition, on the contrary, where this passage is somewhat longer, that the opening of the integuments retracts by virtue of their organic contractility, and allows the return of the bullet by the same route no longer, it becomes, then, necessary to enlarge the wounds and search after it, for the purpose of extraction. Experience corroborates this opinion, and as we have surprized nature in the act, we propose to give a true and exact account of what she has presented us with in the individual subjects of the following observations.

*First Observation.* A grenadier of the imperial ex-guards, in a skirmish which took place the day previous to the battle of Craone, in 1814, received a gun-shot wound in his left thigh. This soldier presented himself at the field hospital (ambulance),

in order to have his wound dressed; he walked with his body crooked, the affected thigh and leg bent, and he suffered some extremely painful twitches at the centre of the wound without being able to assign the true cause. Upon examination it was found that a portion of his shirt had become deeply entangled in a round and scarcely perceptible wound, situated on the inner and superior side of the left thigh. It appeared to have insinuated itself far into the cellular texture which separates the tendons of the triceps adductor, the sartorius muscle, and towards the little trochanter. I concluded at once that this piece of shirt had been pushed by the bullet into the substance of the thigh. In order to overcome the resistance of the closed orifice of the wound of the integuments and aponeuroses which had made way for this twofold foreign body, I accordingly enlarged, with the aid of a blunt-pointed straight bistoury, the two superior and inferior angles of the wound, and after pulling a little, I succeeded in extracting this shred of folded shirt, at the bottom of which there was enclosed a bullet of heavy caliber and a piece of the material of his pantaloons. This projectile was flattened and one of its sides somewhat jaggy, which induced the belief that in its passage it must have encountered the apex of the little trochanter. In fact, the female catheter, introduced into the wound after the extraction of the extraneous substance, sunk beyond that eminence towards the linea aspera of the femur. The wound which was afterwards treated as a simple wound, got well in a few weeks.

*Second Observation.* In the disastrous battle of Mont-Saint-Jean (Waterloo), 1815, a young soldier of the line received a shot during an attack upon one of the enemy's positions. The bullet which had been thrown from a height, after passing over the waistband of the breeches, had penetrated a little above the spermatic vessels of the right side, and pushing before it a piece of shirt, it had travelled under the skin and over the passage of the cord, till within the scrotum on the external side of the testicle, in such a manner that the shirt formed a complete envelope, at the bottom of which there was the bullet as in the preceding case. In this situation and in order to relieve the painful twitchings which he felt, the wounded

soldier was obliged to keep himself in a bent position. Doctor Lacipière, the surgeon-major, who received and dressed the wounded man at the ambulance of the third division of the first army-corps, after having enlarged the orifice a little, accomplished the extraction of the double foreign substance without any difficulty. There was no other unfavourable symptom, nor did the testicle sustain any alteration whatever.

*Third Observation.* Finally, at the military hospital of Gros-Caillou, in the early part of January 1816, we have had under treatment one Alphonse Marseille, a soldier of the 10th regiment of the line, now belonging to the corps of the royal guards, on account of a fistulous sore, of two or three lines in diameter, which he had on the right side of the abdomen, two fingers breadth or thereabout from the most projecting point of the edge of the false ribs. The causes of this fistulous sore, thus penetrating obliquely from the right to left and inwards till within the interior of the abdominal cavity, were by that soldier referred to the following circumstances:

Whilst in Catalonia with the 10th regiment, in April 1815, he received, during a fight between the soldiers of the same regiment, a shot in his belly. It appears that the bullet having gone in the direction above mentioned, had shoved some part of his shirt before it, forced itself through the muscular substance, and at last penetrated, with it into the abdominal cavity. The wounded man, having fallen to the ground after the shot, received the first assistance from one of his comrades, who being unable to pull out the part of the garment which was entangled in the wound of the abdomen, cut it with a knife to the level of the orifice.

The Spanish surgeon of the hospital of Figuières, to which the wounded man had been carried, omitted to make any further search after it, and contented himself with the application of a simple dressing over the wound. Soon after, however, inflammatory symptoms made their appearance, the belly became tympanitic, and the patient passed a considerable quantity of blood by the alvine discharges; this sanguineous evacuation had been preceded by a violent colic and repeated disposition to vomit. Mild beverages and emollient cataplasms having been resorted

to for several days, the original symptoms subsided; a copious suppuration became established in the wound, and after about three months, the same surgeon, guided by a piece of linen which had shown itself at the bottom of the wound, enlarged the border of the latter at last, seized the rag with his fingers and a strong pair of forceps, extracted it altogether. This piece of linen formed a sac of about four inches in length, at the bottom of which was the bullet. From that moment the patient gradually recovered, and was soon in a fit condition to be removed from one hospital to another, when he subsequently arrived at that of Gros-Caillou at Paris, where, as has been already stated, he was finally admitted.

There is one more remarkable species of foreign bodies which we cannot pass over in silence, and which we have had an opportunity to notice with the majority of our wounded in Syria, during the expedition in Egypt. While the process of suppuration of their wounds was going on, the wounded were much annoyed by the worms or larvæ of the blue fly, peculiar to that climate. These insects, hatched in a few hours, developed themselves with such rapidity that, from one day to the next, they grew to the size of a small goose-quill, which greatly terrified our soldiers, whatever we might say for their encouragement to the contrary notwithstanding. Nothing short of experience could convince them that these insects, so far from being injurious to their wounds, promoted rather their cicatrization, by cutting short the process of nature, and by causing the separation of the cellular eschars which they devoured. These larvæ are, indeed, greedy only after putrefying substances, and never touch the parts which are endowed with life; under these circumstances also we have never seen hemorrhage occur, whatever might have been the depth to which, according to the extent of the injury, these insects had found their way. Lotions of a strong decoction of garlic, of rue or common sage, prepared at every time of dressing, were sufficient to cause their destruction; but soon after they were reproduced, owing to the insufficiency of the proper means to guard against the approach of the flies and to prevent the incubation of their eggs. But this may be

readily accomplished by soaking the first compress of the dressing in a solution of camphor or any other antiseptic fluid.

*Of the Treatment of Gun-shot Wounds.*

We shall now proceed to the examination of the indications which gun-shot wounds present at their different periods; but before we make known these indications, we will point out a highly important rule which has not at all been disposed of by writers. It relates to the order of dressing a patient who has been wounded in several places. This rule then consists, after commencing with the dressing of the most simple and least important injury, to proceed with that of a more serious one, and so on in succession to the most important, more particularly if this should command a painful operation. It is easy to comprehend at once the reasons of this method of proceeding. It is self evident that if a beginning were made with the last wound, the patient might be seized with syncope after the operation, which would render it necessary to postpone the dressing of the other wounds; or, perhaps, frightened and fatigued by the greater or lesser intensity of the pain, subsequent to the operation which he has undergone, he might decline any further assistance; whilst, on the other hand, the cares bestowed upon the more trifling wounds being less painful, the wounded, encouraged by it, has not near so much cause to dread the treatment of the more serious ones.

During their first period gun-shot wounds require a simple, slightly tonic and compressive treatment; tonic, in order to restore the weakened action of the blood-vessels underneath the eschar of attrition, whereby the exfoliation of the latter is promoted and the wound is promptly cleansed; compressive, in order to prevent too considerable a swelling of the injured parts, and to excite the reaction of the blood-vessels. Now, then, with a view to accomplish this twofold indication, a linen rag, with holes in it (*fenêtré*) soaked in warm camphorated wine, or in salt water (*eau marinée*), with a few drops of the acetate of lead in solution, should be immediately applied, and secured by compresses and rollers, or many-headed bandages, soaked in the same fluid; taking care that the pressure of the bandage to be

employed be uniform. We contrived this method of dressing about the beginning of the campaign of the army of the Rhine, in 1792, and from that period have constantly made use of it.

In case symptoms of local erethismus or general plethora should come on, the vascular system requires then to be reduced by blood-letting, diluents, and thin broths. The employment of leeches, so much extolled by the physicians of the present day, cannot be but improper, in as much as they augment the stagnation of the fluids in the blood-vessels of the disordered parts, which intumesce and become affected with gangrene. Besides, the application of leeches requires the dressing of the wound to be taken off, when the want of compression which must result from it, would be sufficient alone to induce the swelling and all the other symptoms which have just been enumerated.

If gun-shot wounds are attended with hemorrhage, they must necessarily be enlarged, so as to lay open the arteries, and apply to them the mediate or immediate ligature,\* the latter, if practicable, should always be preferred. The same measure is also indicated when the wounds extend over the fleshy and aponeurotic parts, and when in their interior there are obstructions of such a nature as to occasion strangulation, or extensive denudations, which may have destroyed the vascular communications and the relative connexion of parts. Gun-shot wounds, on the contrary, in parts of the body, where there are neither muscles nor aponeuroses, such as the periphery of the cranium, the sternal region, and the surface of certain articulations, must not be enlarged, unless for the purpose of searching after some artery with a view of applying a ligature, or in order to divide some lacerated nervous cords; finally, these enlargements, should they become necessary, must be made with

\* The French surgeons understand by the *mediate* ligature that which, besides the divided artery, includes also the surrounding cellular tissue and muscular fibres, as in cases where the artery has much retracted within the muscular substance, and is not, of course, within reach of either forceps or tenaculum. The *immediate* ligature is that which, after the artery has been seized and drawn out by a common dissecting forceps, is at once brought to bear upon the blood-vessel to be secured thereby.—*Translator.*

circumspection, lest any blood-vessels, nerves or tendons, before uninjured, might be affected.

This indication being fulfilled, the edges of the wound are to be drawn together and kept in their place by means of perforated rags, spread with some balsamic substance, or soaked in warm wine or salt-water, &c.; scraped lint or hemp, secured by compresses, are next to be applied over it to absorb the fluids, and the application of an appropriate bandage will complete the dressing.

This dressing, except for some imperative reason, must not be touched before the seventh, eighth or ninth day; for it is of great consequence to wait till suppuration has cleansed the parts, and spontaneously loosened the pieces of the dressing; and it is attended with considerable mischief to prematurely remove them, especially in the winter season. We have seen a great many individuals who had undergone the operation for amputation of the shoulder or arm, travelling over immense distances, from the field of battle to their ulterior destination, without their being dressed again. All they did was to sponge the exterior of the dressing daily, and cover it with a piece of skin, or oil-cloth, or any other material, when, nevertheless, these men after their arrival saw their stumps cicatrized, or far advanced in the cicatrization. The ligatures and sloughs having come off of their own accord, were found within the dressing. Amongst others, a chief of a battalion, whose arm had been amputated at the shoulder, repaired from the battle of the Moscowa to Paris, without being dressed once, and at his arrival in the latter city found his stump completely cicatrized. He daily wiped off with a sponge the suppurated matter which ran over the dressing which had been applied by me after the operation. General Janin, one of the warriors of the old army who in the action of Elsberg in Prussia had the jaw-bone shattered and a large portion of the lower lip and of the cheek destroyed by a biscayan, secured the complete success of the operation which I performed on him upon the field of battle, by carefully retaining the methodically applied dressing, until he arrived at Paris, where he caused the ends of the suture over the already united cicatrix to be cut off.

If these wounds are complicated with fracture or shattering of the bones, it becomes likewise indispensable to cut down in order to ascertain the internal injury; extract the moveable, isolated or displaced fragments; reset those of which there is some hope of their uniting again with the rest of the bone; and perform in some instances the operation of resection.\* As to the dressing of these kinds of wounds, it differs in no way from that above described. We shall elsewhere more fully dwell upon such fractures.

This then is a summary of the principles which are to be acted upon in gun-shot wounds of a recent date; but if other symptoms have come on, blood-letting will be required according to the intensity of the local inflammation, as characterized by the tumefaction and the more or less vivid redness of the parts, the heat and some kind of deep and troublesome pulsation, and according to the state of turgescence under which the patient labours. General blood-letting is preferable to leeches which, so far from dispersing the inflammation, increase it and invite an attack of gangrene. We know a great many instances of such a result, of which we shall endeavour to give an explanation in the article on compound fractures of the lower extremities, in another volume. Equal circumspection is required in the use of emollient applications to the engorged parts. Mild tonics and an uniform, but careful pressure, are almost always more serviceable. A rigid diet and cooling drinks are indicated.

If, notwithstanding these measures, the inflammation should not be disposed to terminate in resolution, and be converted into an erysipelatous affection, or if it should terminate either by an excessive suppuration, or by hospital gangrene, or finally by gangrene, the disastrous consequences of each of

\* The operation of resection refers to the surgical practice of cutting off the articulating extremities of the bones, or of some portion of their continuity, as in cases of disunited fractures, where the extremity of the bony fragment is cut off. This operation has been successfully performed on the head of the humerus, on the elbow-joint, the radio-carpal articulation, the ribs, the femur, the knee-joint, the inferior maxilla, &c. The performance of it requires the utmost circumspection in the management of the large blood-vessels and nerves, as well as the tendons which are attached to these articulations.—*Translator.*

these affections may be prevented by the measures which we are about to mention successively.

*Of Traumatic Erysipelas.*

The erysipelas which in the vicinity of a wound supervenes after the fourth or fifth day from the occurrence, necessarily acknowledges its essential cause to exist in an over-excitement of the nervous and vascular systems of the deeper situated edges and walls of such a wound, an excitement which is ordinarily produced by their too sudden union, more particularly when the division has not been simple and uniform like that which is made by the instrument of the surgeon.

The use of agaric-tents or other foreign bodies introduced into this solution of continuity; the application of greasy or too irritating substances, or even of emollients at an excessive temperature; the contact with the cold and moist air; the state of attrition and laceration of the injured parts, or some gastro-bilious affection, are so many causes which may give rise to this over-excitement. An impression once made upon these injured and highly irritable parts, produces, on one hand, the curling and the erethismus of the ruptured vessels of the organs which ought to induce the suppuration and the disgorgement of the inflamed tissues; on the other, the capillary veins of the cutis (which, from their nature and superficial situation, do not participate to the same degree in that deep erethismus) absorb the fluids poured out into the wound, and transmit them by a kind of peristaltic and divergent contraction towards the external surface, so as to occasion the erysipelas just spoken of. If this absorption takes place immediately after the wound has been inflicted, either because of its being closed up, or because of its being left altogether to the resources of nature, the consequence will be a more or less extensive ecchymosis, produced in either case by the passage of the arterial blood into the cutaneous veins, which absorbed it in the interior of the wound, and carried it to distances proportionate to the causes of local irritation and disturbance. In case the fluids, poured out within the wound, have been changed, so as to present a purulent character, their absorp-

tion by the same vessels will afterwards cause an erysipelatous affection to be developed, for, at the same time that these morbid principles, in their passage through these vessels provoke a spasmotic contraction of their coats, the blood contained within them is rendered even more fluid, owing to the effects of the increased heat of the part, as well as to its mixture with the purulent and acrid molecules taken up in the wound. All these causes produce the fulness of the epidermis and the redness, the intensity of which is augmented by its coming in contact with the oxygen of the atmospheric air. In consequence then of this continued reaction of irritation and infection, the erysipelas increases and spreads rapidly over the same regions, and stops only at the more or less firm adhesions of the integuments, such as those which extend over the bony projections. If afterwards, in addition to its traumatic origin, there should be combined with it some deleterious miasma arising from mephitical exhalations, or from some focus of contagious disease, the erysipelas will then promptly terminate in gangrene; and as this latter affection paralyses in its turn the vital principle of the internal organs, the cessation of the vital functions in the injured tissue, and soon after the total destruction of the individual will be the result, unless the progress of the mortification can be arrested or circumscribed.

In the case, however, of the presence of some bilious derangement, the erysipelas and the wound assume a yellowish tint and become complicated with symptoms of hepatitis. Finally, if there exist any signs of an atonic condition of the stomach, accompanied by sour eructations or nausea, the erysipelatous exanthema grows pale, the edges of the solution of continuity become bloated, and its bottom is covered with a thick grayish and putrescent substance, which characterizes the adynamia and hospital gangrene.

We have already pointed out the measures to be adopted for the purpose of preventing or dispersing the ecchymosis which is an attendant upon wounds and contusions; we now propose to treat exclusively of the traumatic erysipelas which is a modification only of ecchymosis, for the difference of both these two species of pathological injection holds only

with respect to the nature of the fluids which circulate through the infiltrated vessels. Now, erysipelas is produced by the admixture of a greater or lesser quantity of purulent molecules with the venous blood, whilst the blood effused into the wound by the divided or lacerated arterioles, taken up again by the veins and extravasated on the surface of the skin, or within the subcutaneous cellular tissue, is what constitutes an ecchymosis; yet the tissues are not by any means inflamed, and therefore the indication cannot be one and the same.

What, then, is most proper to be done in erysipelas? The plans of treatment devised are as numerous as the authors who have written on this affection; but most all of them, and especially those who have embraced the doctrines of Broussais, advise capillary depletions by means of leeches applied to the erysipelas, as the first and most important remedy to be employed. These writers believe that by thus emptying the engorged vessels the disorder can be entirely arrested, because in the first place the intensity of the colour is diminished, and on the other hand the pains are relieved and frequently subdued altogether. This is apt to mislead, however, for the local depletion by leeches does not operate upon the injected or erysipelatous vessels. These animals rather avoid them, and directing their pointed and cutting fangs deeper, go in search after the arterioles at the bottom of the dermoid tissue, which they open in preference, in order to suck the vital blood, instead of imbibing the puriform sanguineous fluid which is contained in the superficial veins.\* *The pathological engorgement remains stationary therefore;* the vehicle only of life is reduced; the sensibility is blunted; the functions of the individual are impaired, and the vital properties are extinguished within the engorged parts,

\* I have investigated the distribution of the vessels of which the dermoid tissue is composed, in the anatomical preparations and very fine injections which I have seen in Germany, in the cabinets of the celebrated Prochaska and Soemmering. These injections, of some of which I am possessed, are quite well enough prepared to plainly distinguish with the microscope the two layers of vessels. The most superficial is entirely composed of veins, and the next of arterial vessels which extend far through the more or less compact net work in the interior of the dermoid texture.

which become forthwith struck with numbness, and soon after with a gangrenous disorder, the progress of which it is difficult subsequently to arrest. Moreover, the instantaneous irritation which the leeches excite in the dermoid system, is sufficient to determine the disorder to assume a phlegmonous character, by propagating the erysipelas as far as the cellular texture; a result the more disastrous, as this tissue is scarcely inflamed, when a degree of suppuration becomes established, the effects of which extend still farther by the production of sinuses and purulent discharges, which result in the denudation of the skin and muscles, and in the more or less extensive destruction of that very same cellular texture. Emollient applications, whatever may be their mode of preparation, increase likewise the general relaxation, the engorgement, and give rise to analogous symptoms. The topical repellents and rubefacients which are recommended by some writers, are attended by the still greater inconvenience of heightening and spreading the inflammation farther, whilst the excoriations produced by the latter topical means are often followed by gangrene.

This variety of remedies, and the usually distressing consequences which resulted from them, have led several physicians to say that the cure of this disease ought to be left to nature; but she is rarely sufficient for herself; and if art could not promptly afford her relief, she might perhaps be overcome; for there frequently occurs some kind of metastasis by which the morbific principles which produce this exanthema, are transferred to the internal organs, so that if the patients be not destroyed in consequence of the deleterious and contagious effects of the local gangrene, they perish from the sympathetic and consecutive affections of the viscera. We have witnessed a great number of instances which have prevailed with us to make new investigations, and to study with scrupulous attention the development of this traumatic erysipelas, whose march is so rapid, and the career of which it is so important to arrest in order to prevent its almost uniformly fatal results.

Without regard to the causes concomitant upon the formation of this disorder, some remedy must be promptly employed,

capable of arresting this peristaltic inflammatory action, by absorbing the morbid principle along with the fluids which harbour it, and by restoring at the same time the vital properties to the diseased tissues, from which this morbific stagnation had expelled them. The actual cautery has appeared to us to produce this double effect, and the most extraordinary success has warranted our attempt. Towards the end of the last century, M. Pelletan (of the Institute of France), whose eloquent lectures furnished the majority of the luminous ideas which have led the modern physiologists to so many discoveries, had already pointed out this local application as a powerful revulsive in erysipelas. Applied to the reddest spots of the erysipelas, and to those which are nearest to the wound, the incandescent iron arrests, indeed, instantaneously, the progress of the phlegmasia. This application, which gives but little pain, if any at all, is attended and followed immediately—1st, by a gaseous effluvia of an animal odour, rendered visible by some slight smoke, in which it is enveloped; 2dly, by the disappearance of the heat and painful tension which the patient before experienced all over the inflamed part; 3dly, by a dispersion of the redness and swelling before perceptible; 4thly, these cauterizations are no ways followed by suppuration, or, like the rubefacients, are capable of producing gangrene: the burned portions of the cutis fall off in small carbonaceous scales, and leave no sensible cicatrix; 5thly, the purulent flow of the wound, the suppression of which preceded the erysipelas, becomes almost immediately re-established; 6thly and finally, the powers of the patient revive at the same time, and the impaired functions of the viscera, particularly those of the stomach, rally again and thus contribute to the entire resolution of the exanthematous disorder. Besides, if there should yet remain some symptoms of a gastro-intestinal affection, the revulsive effects of the actual cautery will be completed by the exhibition of one grain of emetic tartar, dissolved in a cold and strained infusion of ipecacuanha.

Such are the facts. But, how shall we explain the phenomena which we have just dwelled upon? The solution of this question I leave to physiologists; I have intended nothing

further than to draw the attention of practitioners to the efficacy of the actual cautery in combating the disease in question. Nevertheless, we shall endeavour to account to ourselves for the cause of several of these phenomena, the existence of which seems scarcely credible, if the sources of their production could not be so clearly demonstrated.

1. We have stated that the application of the red-hot iron to the erysipelatous inflorescence is made without giving any very sensible pain. We believe that this insensibility must be ascribed to the more or less condensed layer of vascular network which has been injected and covered up by the already disorganized epidermis, so that this layer isolates and protects the nervous tissues of the skin.

2. The burns do not suppurate, because the cautery has spared also the sensible texture of the dermoid tissue, in which the arterial vessels reside, which alone are capable of bringing on suppuration. Indeed, if the red-hot iron is quickly and gently applied to the erysipelatous exanthema, as in such a case ought to be done, the cauterization will be confined to the vessels which are injected and in some measure deprived of vitality; and in that manner the little eschars, thereby produced, come off in dry and carbonaceous scales, and the epidermis all over that part of the skin which has been attacked by the erysipelas, falls off in more or less compact scales.

3. Finally, as the dermoid tissue had not been encroached upon, as we have just now stated, the burnt places cannot, of course, leave any cicatrix.

But, in order to prove the efficacy of the actual cautery, we shall detail, as briefly as possible, the observations made on several individuals, in whom the gentle and prompt application of this revulsive caused, as if by enchantment, the disappearance of the traumatic erysipelas; together with the adynamic and anomalous fever which accompanied it. We have not kept an account of the several experiments which we have instituted at different periods, because we could not completely follow up their effects; we shall therefore confine ourselves to a statement of the following observations.

*First Observation.* John Féton, aged 22, a gunner in the

horse-artillery of the guards, was brought to the hospital on the 5th October 1825, that being the sixth day after he had received a contused wound on the right leg from the kick of a horse, the impression being made with so much force that a portion of the tibia was denuded. During the first few days gentle repellents had been applied to this solution of continuity; but symptoms of local inflammation coming on towards the fifth day, emollients were substituted. After that, the wound assumed an erysipelatous character, signs of a general nervous affection began to show themselves, and soon after the erysipelas increased and rapidly spread over the whole leg and foot, both of which became tumefied. On the eleventh day, well marked reddish lines extended far up the thigh, and small gangrenous vesicles began to appear round the wound. At the time when this gunner was brought into the surgical ward, the animal sensibility of the whole limb was already extinct, or at least considerably blunted, whilst the limb itself was much bloated and of a reddish purple colour. The patient was troubled with nausea, vertigo, and complained of numbness and an unpleasant heaviness in the leg; his pulse was small and feverish; the tongue black and dry; the eyes dull and watery; the countenance wan; urine scanty and dark; and, in short, the whole announced imminent danger.

We immediately administered to him an emetic, after the formula above mentioned, succeeded by the chicken broth emulsion and by mucilaginous drinks, sweetened and aromatized with orange flower water. The diseased limb was enveloped in compresses, soaked in hot and strongly camphorated vinegar. Finding at our next visit, on the following day, the erysipelas still in the same condition, and the ataxia, which existed nearly to the same degree, threatening the patient all the time with impending dissolution, we decided on the application of the actual cautery to all the principal places of erysipelatous engorgement, by commencing with the red streaks on the thigh, and afterwards by descending successively to the knee, leg and foot, taking care, however, to leave considerable distances between the cauterized spots, and to avoid the cutaneous adhesions to the bony projections. Fifty irons

heated to incandescence were thus put on in less than six minutes, besides which we applied one more to the epigastrium. Compresses soaked in the before mentioned tonic lotion were placed over the limb, and secured by means of a moderately tight bandage; internally the same remedies were prescribed. Our surprise was extreme, when on our next visit we found the erysipelas almost entirely gone, and the swelling of the limb considerably reduced. A good suppuration was already re-established in the wound; the tongue was moist and less black; all the functions were revived, and the patient who, the day before, could not utter one word, declared with a loud voice that he was better. He had on the same day several dark and extremely fetid alvine evacuations. The dressing of the limb was renewed, and the same regimen and remedial treatment continued. In less than three days all the symptoms of the erysipelatous affection and traumatic fever had entirely disappeared; the wound began to assume a healthy appearance, and the tumefaction of its edges subsided; a piece of bone subsequently ex-foliated, immediately after which the cicatrix was formed. Convalescence was now no longer doubtful, and we were enabled to announce the recovery of the patient and his removal from the hospital, which took place on the 1st of December following. The burns from the heated iron had never been attended by suppuration, and have left no mark whatever on the skin, where the cautery had been applied.

*Second Observation.* The subject of the second observation is one V—— (Nicolas), a private of the 5th regiment of infantry of the guards. At the time of admission into the hospital, on November 25, 1825, this man had received, five days before, a small wound upon the head, which was situated on the lateral and superior region of the forehead, and had been occasioned by some contunding body, the shock of which was connected with a very trifling rent of the pericranium, and a pretty extensive denudation of the frontal bone. A simple dressing had been applied and continued to the period of his entering the hospital. After that, an erysipelatous engorgement, sufficiently distinct, presented itself in the face, as well as over the whole surface of the head; still there were

no febrile symptoms as yet, and scarcely did the patient experience some transient pain in the head, with an unpleasant heaviness of that part. The extensive denudation of the bone, which we discovered with the aid of a probe, and the quantity of sanguineous fluid which we found effused between the integuments and the cranium, induced us to make a crucial incision through this portion of the skin, the centre of which being formed by the pre-existing solution of continuity; this division was accompanied with some trifling effusion of blood, after which it was dressed with a perforated linen rag, spread with saffron cerate, and a simple retaining apparatus applied over it.

The patient felt somewhat relieved by this operation; however, on my visiting him the next day, the erysipelas of the face had become fully developed, and prevented him from opening his eye-lids; it extended to the ears, over the shoulders and the whole neck. Some febrile action had manifested itself likewise, and the tongue was dry and covered with a brown crust; in other respects the lips of the wound were disposed to suppurate, and presented nothing remarkable. We prescribed mild mucilaginous drinks and purgative enemata; but, on the evening of the same day, as the erysipelas had spread still further, and the fever had now assumed a nervous character, we were anxious to make use of a sufficiently large number of heated irons, which we applied accordingly to the temples, over the whole posterior region of the head, to the back of the neck and shoulders, taking care only to apply the incandescent iron at proper distances and with the utmost despatch. Compresses, soaked in camphorated vinegar, were put over the cauterized spots, and in other respects the same regimen was continued.

On the following day we found our patient sensibly improved; the erysipelas had almost entirely disappeared, and resolution continued to go on progressively. The suppuration of the wound increased in the same proportion, and on the tenth day the disgorgement of the whole head was completed. At length the functions were promptly restored, and before the nineteenth day, the patient was in a fit condi-

tion to get out of bed and to eat some light food. Towards the thirtieth day, an exfoliation of no great extent had taken place, where the bone had been denuded, and on the 29th December, forty days after the accident, our patient left the hospital, with his wound cicatrized, and his health perfectly restored.

None of the burns, the number of which amounted to forty, were followed by suppuration, nor have they left any sensible mark upon the skin; but the epidermis of the integuments, as far as the erysipelatous affection had been established, fell off in scales, which were only a little thicker in the burnt parts.

Corresponding results from the application of the incandescent iron have not only been obtained for other wounded, who had been taken with traumatic erysipelas, but likewise in cases of simple erysipelas, whether spontaneous or symptomatic.

#### *Of Abscesses or Purulent Sinuses, subsequent to Wounds.*

If, subsequent to the solutions of continuity which engage our present attention, abscesses or purulent sinuses should be formed, they ought to be opened with a bistoury and their focus laid bare. The method of making incisions or counter-openings is preferable to that of compression which has been extolled by several writers and by many practitioners. The compression has the great inconvenience of causing an infiltration and extensive diffusion of the fluids of such abscesses into the cellular texture, without relief to the original injury, and of prolonging or aggravating the complaint.

#### *Of Hospital Gangrene.*

After the first campaigns in Germany, I have already had occasion to remark in my clinical lectures at the military hospital of the guards, that the hospital gangrene must not be confounded with gangrene, and that both these diseases presented very distinct symptoms and a career totally different. A summary of the observations which I have made upon the individuals attacked with these two species of diseases, is contained in the case-books of surgical observations

of that hospital, and in my memoirs on gangrene, which will be the next subject for consideration.

The proximate cause of the former of the two affections is to be found in an increase of the sensibility of the injured parts; which is induced by a more or less excitable idiosyncrasy of the individual and by his predisposition to an adynamic state; by the moisture of the atmosphere and by too long an exposure of the wound to the miasmata with which it is impregnated, particularly those which are the product of a similar disease, or of putrid emanations from animal substances; by the use of too irritating ointments, cold and astringent lotions; improper and too frequent dressings. When it is induced by a spontaneous adynamia, its invasion is ushered in by a state of prostration of the patient; by paleness of the countenance, whiteness of the tongue, which is covered at the base with a crust of more or less inspissated yellowish mucus, and which is alike observable round the roots of the teeth; by quickness and smallness of the pulse; by irregular shiverings, anorexia and anxiety. Dull and tensive pains begin to be felt in the wound, the edges of which swell, and assume a purple or livid aspect; the suppuration diminishes sensibly and acquires a glutinous character; the pains increase, as well as the local tumefaction. This soon spreads over all the points of the solution of continuity, the spaces of which are filled up with a pulpois substance of a grayish colour, from which a nauseating odour issues, resembling that arising from the putrid vegetable glue of painters, and which cannot be compared to any thing better than to the grayish film which may be observed on the stagnant waters of morasses. This putrefaction extends itself to the surface of the wound, the tissues of which, especially the fibrous, cellular and dermoid, it is prone to disorganize; the skin curls up in festoons, as it were, and readily allows itself to be encroached upon by this contagious distemper, which quickly spreads from one point to another by a sort of successive erosion, with which it acts upon the parts accessible to its influence; it penetrates deeply into the interstices of the muscles, but leaves their moveable fibres untouched, and in like manner allows the arteries and

nerves to escape, because these organs resist the effects of these putrid morbific substances, in consequence, no doubt, of the highly active vital principles essentially contained in them, the oxygen which circulates with the blood of these vessels, and the animal electricity which pervades the nervous cords; thus, when the wounds are cleansed and freed from the putrefactive matter, the muscles, arteries and nerves will be found untouched, and are pretty speedily filled up with vascular granulations.

The inoculation or transposition of the putrefactive matter to other simple wounds, though their cicatrization shall have advanced already, produces there the same kind of affection, and soon converts them into putrid ulcers, similar to the first. Instruments and dressing rags are very often excellent conductors. This inoculation I have seen performed, and have observed its progress up to the period of its termination. I believe, therefore, whatever may be the assertion of some authors to the contrary, that the contagious tendency of this disease, which differs essentially from gangrene, can be no longer doubtful. The effects of hospital gangrene are to attack the integrity of the internal vital organs and to derange or weaken their functions, just as a general adynamic state, as has been before mentioned, will induce the disorder itself. Thus, in cases of the most simple solutions of continuity, the exhibition of an emetic in season, succeeded by the use of good bark, may cause the nervous or general putrid affection to disappear, while the employment of certain applications to the wound, such as the actual cautery, will completely destroy this gangrene or local affection.

After the development of these symptoms, it will be easily understood that the disease which now occupies our attention, presents three stages, which it is useless to go over at present; but when arrived at its third period, it then travels with frightful rapidity, and in such a manner as quickly to disorganise the dermoid, cellular, aponeurotic, cartilaginous, and even osseous tissues. If the disease has spread to a great extent, the ichorous principle of the secreted matter is absorbed by the venous system and transmitted to the internal organs. On the opening after death of persons who have fallen victims

to this complaint, the blood of the veins of the diseased limb is found to be mixed up with puriform molecules and bubbles of air ; there are purulent sinuses in the cellular texture and in the interstices of the muscles, and finally a collection of matter or putrid serum in the viscera, particularly those of the diseased side as far as the cerebral membranes, which verifies our opinion on the true causes of abscesses of the liver, subsequent to injuries of the head ; for it is the serous tissue of these organs which is always the most affected, whilst the mucous membranes of the stomach and intestines remain unaltered. Now, the consequences of this metastasis and of these sympathetic irritations characterize what is understood by adynamia.

When hospital gangrene appears to be the consequence of a gastric nervous affection, the topical means indicated should be preceded by an emetic, by the administration of bark, or rather the sulphate of quinine combined with camphor and opium, and by mild mineral or acidulated lemonades. The hydrochloric acid, which ought to form the base of such lemonades, has appeared to us to produce very good effects. These remedies frequently arrest the progress of the disease, relieve the stupor, the local irritation, and promote the cleansing of the wound, which, of its own accord, casts off the putrid grayish film which covered it, and very soon reassumes a vermillion appearance. This I have witnessed many a time, and proves (though contrary to the opinion of the Professor of Montpellier,\* who is the author of an excellent treatise on hospital gangrene) that it may be symptomatic. Most commonly, however, it is idiopathic.

In the former case, as in the latter, after having fulfilled the indication relative to the general adynamia, if it should exist, it is necessary to persevere with the remedies which are most suitable to procure both the removal of the putrescent matter and the final draining of its source. The Eau de Labarraque,†

\* Mémoire sur la complication des plaies et des ulcères connue sous le nom de Pourriture d'Hôpital, par J. Delpech. Paris, 1815, 8vo.—*Translator.*

† Eau de Labarraque, or disinfecting soda liquid, prepared first by M. Labarraque, a distinguished chemist and pharmaceutist of Paris ; it is a compound of chlorine and soda, analogous to the well known bleaching powder, chloride of lime. It may be obtained easily and cheaply by decomposing the chloride of lime by the subcarbonate of soda. Mix one part of dry chloride of lime with

which we have had occasion to use ever since its discovery, (and it is one of the most important which chemistry has made,) possesses the property of dissolving that substance and of causing its disappearance from the surface of the wound. Yet, this remedy will by no means destroy the cause which produced it, and so far from obviating the deep seated irritation which exists in the solution of continuity, it appears rather to maintain it by its slightly caustic or corrosive action. But, after using this or whatever other remedy may be calculated to remove the more or less dense layers of putrefaction, the actual cautery may be used with the greatest advantage. It ought to be applied while the iron is in a state of incandescence, and care should be taken to carry it sufficiently deep to reach all the points of ulceration. Occasionally it is even necessary to repeat the cautery, which, so far from being an act of cruelty, as it is believed, removes the pains of the patient, and restores him to a state of ineffable ease. The latent inflammation is promptly dispersed, the wound is cleansed and grows bright red, and the cicatrization afterwards goes on with great rapidity.

Such is, in a summary way, the origin and progress of this consecutive complaint. After this we now propose to examine the complaint which we have designated with the name of traumatic gangrene.

#### *Of Gangrene.*

Gangrene is characterized by the gradual diminution and entire disappearance of sensation in the injured parts. The suppuration of the wounds, where it exists, is less abundant, and becomes fluid, sanious, and of a blackish colour ; it very soon forms a brown or black slough, more or less thick, soft or compact, according to the nature of the gangrene ; the odour which it exhales is fetid. This affection travels rapidly and

twelve parts of water, allow the liquor to settle for three hours in close vessels, filter and wash the dregs with two parts more of water. Dissolve with a gentle heat two parts of crystals of subcarbonate of soda in four parts of water, and let the solution cool. Then mix and stir the two solutions well. A copious precipitate of carbonate of lime will be the result, and the liquor, after settling, is decanted or filtered and bottled up tightly.—*Journal of the Philadelphia College of Pharmacy, Vol. I. p. 278.—Translator.*

exercises a particular influence upon the brain and nervous system, so as to produce there an ataxia, while the hospital gangrene confines its operation to the fibrous and serous apparatus of the organs of internal life, in which case those of the life of relation remain unmolested.

The causes of this mortal affection are the attrition and commotion of the parts which have been seized with it: the former of these may at the moment of the occurrence produce a slough which cannot be mistaken for the gangrene, properly so called, the result of which, however, is the same; but shortly after, this eschar of attrition is detached; the swelling which appeared at first is scattered, and the surrounding parts which were the seat of it, return to their primitive integrity. In gangrene proper, however, the swelling increases successively, till the disorganization of the tissues is accomplished, of which it spares none; the epidermis is converted into vesications (*phlyctenæ*); the dermis turns black, is dried up or decomposed; the cellular texture, the aponeuroses, muscles, nerves, and blood vessels are alike attacked by this mortification, and are involved together in the disorganized mass; the fluids coagulate within their vessels above the point of disorganization, especially in the dry gangrene, or gangrene from frost-bite, which presents some differences from that which occupies us at present.

If a portion only of the external organs has been attacked by it, it is designated by the name of partial gangrene; if it attacks the totality of a limb, it is then characteristic of *sphacelus*, which will be more fully spoken of under the head of amputations.

A gangrenous affection may be induced by a sickly habit of the patient: thus the yellow fever, during our expedition in Egypt, caused it to be developed in the wounds of all those who had been attacked by that fever, even in cases of the most simple wounds, as those made by side arms.

This complication never requires the actual cautery, as recommended by some writers, notwithstanding its efficacy in hospital gangrene. So far from arresting the progress of gangrene, this caustic increases the disorganization of the tissues and propagates the deleterious action of the disease. When it is merely local, its separation may be facilitated by means of

anodyne emollient applications to the periphery of the sloughs, the whole of which, or as much of them as is practicable, should be removed afterwards with a cutting instrument, and the wounds dressed with mild antiseptics, the base of which should be camphor. In case the disorder should have been ushered in, established or kept up by some fever of a bad character, it is necessary first to subdue the exciting cause, or to go on, at least, with the remedies which are best suited to weaken its force.

Finally, under some circumstances, gangrene is a healthy effort of nature, in so far as she concentrates towards the point of disorganization, the effects of the erythema and stupor which far and wide benumb the parts, and cause the traumatic fever to be developed, the consequences of which, frequently and in preference, have a tendency to attack the brain and nervous system.

#### *Of Tetanus.*

Of all the complaints attendant upon wounds, particularly those from fire arms, tetanus is, without fear of contradiction, the most serious, and consequently merits our utmost attention.

It comes on with dull pains in the wound, the suppuration of which is speedily diminished and finally suppressed altogether. The skin becomes bloated and dries up; it is red at first, and afterwards spotted. The local pains soon increase and seem to extend along the passage of the nerves which are in connexion with the wound; and the contact with a cold or moist air, or the touch of the lightest external bodies are sufficient afterwards to occasion them or to impart to them a higher degree of intensity; at last the muscles become subject to convulsive contractions, accompanied or preceded by violent cramps and subsultus tendinum.

Various modifications of tetanus have been admitted to exist, according to the regions of the body, where the contractions are developed and more particularly settled, and according to the acute or chronic character of the disease; every one of these modifications presents remarkable differences.

Sometimes the irritation rapidly extends from the muscles in the vicinity of the wound to the more remote ones, which

become stiff and contracted; sometimes it is suddenly transferred to the muscles of the throat and jaws, where it is concentrated; the latter gradually approach one another and close in such a manner as to admit of little or no separation. Deglutition now becomes difficult, and soon altogether impossible, from the forcible contraction of the pharynx and oesophagus. The trismus, however, as it arises from wounds, rarely exists by itself, but is commonly one of the effects of general tetanus.

When this affection is general,\* all the muscles, external and internal, are attacked at the same time. Whilst the limbs contract and become completely straight, and whilst the whole body grows so rigid that, by seizing one of his extremities, it may be lifted up, as if it were one inflexible mass; the other organs of the animal economy lose, from the same cause, the use of their functions. The eyes no longer retain their usual mobility; they sink into the orbits and become watery; the face colours; the mouth becomes contorted; and the head is in various ways inclined, according to the particular species of tetanus. The walls of the abdomen approach the vertebral column and press upon the contained viscera of this cavity, which, on their part, appear to bury themselves in the hypochondria, the pelvis and the iliac fossæ, where the repeated contractions of the muscles pursue them, and exercise over them a more or less powerful degree of compression. The ribs, where the abdominal muscles are inserted, are drawn downwards; the movements of the diaphragm become restricted; the chest sunk; the respiration short and laborious; the heart contracts more and more, and its contractions, which become frequent and imperfect, cannot but weaken the circulation of the blood. The patient is in a state of watchfulness, and when he does fall asleep, he has dismal dreams; he is restless, uneasy; he tosses about and tries to rid himself of the state of constraint in which the rigidity of his limbs and the inactive state of his organs keep him.

The brain alone has appeared to us, in this universal attack, constantly to maintain the integrity of its functions, even to

\* I do not intend here to speak of any thing else but of traumatic tetanus, for the spontaneous or internal tetanus will not always produce the same results. Read the authors who have written on this species of disease.

the last moment of existence; so that the unfortunate individual who is affected with the disease, is as it were an eye-witness of his own death. However that may be, it is an exceedingly curious phenomenon to see this central organ of the nervous principle remain untouched, whilst all the nerves, even those of the life of relation, are so deeply injured. Still, there is no denying the fact, for in the great majority of persons attacked with traumatic tetanus, whom I have been called upon to treat, I have never seen the intellectual functions disordered, or the senses materially changed. Nay, this circumstance amounts to the surest diagnostic between tetanus and the convulsive or spasmodic diseases, arising from lesion of the brain. I shall not, however, venture any explanation concerning the want of communication of the morbid principle of the affected nerves with the encephalon; for it will always prove that the nervous cords are not by any means, as has been believed, real elongations of that organ.

All the above symptoms make such rapid strides, that very frequently within twenty-four hours the patient can swallow no longer, or swallows only with the greatest difficulty, though at the same time he experiences the utmost desire to drink and even to eat. The latter imperious necessity contributes not a little to the aggravation of the complaint, and it may be asserted that the majority of tetanic patients die of hunger. His pulse is small and hurried; some febrile action, followed by partial and more or less copious sweats, generally comes on towards evening. He declines perceptibly and suffers excruciating pains. The rigidity increases, the muscles may be traced distinctly, and the skin adheres closely to their periphery. The salivary glands pour out a frothy and whitish secretion, which may be seen flowing involuntarily from the patient's mouth; deglutition is also interrupted. It is at this period that the patient becomes aware of the danger in which he is, and that, as we have already observed, without losing the use of his moral faculties, he wretchedly terminates his career on the third, fourth, fifth or seventh day; he rarely survives to the seventeenth.

In emprosthotonus the flexor muscles prevail over the extensors, so as to incline the head against the trunk, the pelvis

against the thorax; and the body thus assumes the shape of an arch.

In opisthotonus, on the contrary, the extensor muscles exceed the power of the flexors; the head is thrown backwards and the vertebral column is reversed in the same way; the limbs remain usually extended. This kind of affection is more rare than emprosthotonus; and I have, moreover, observed that it was more promptly followed by death. It would appear that the forcible extension of the cervical vertebrae and the unnatural position of the head occasion in this case, more than in the other tetanic modifications, a violent compression of the spinal marrow, and thereby confirm the more permanent contraction of the larynx and pharynx. I have remarked, where traumatic tetanus has been produced by wounds, in which the nerves of the anterior region of the body have been injured, that emprosthotonus has been the result of it; but that opisthotonus will take place, when the nerves of the posterior region have received the injury; and finally, when the offending cause has traversed a limb in such a manner as to attack equally both these two nervous expansions, that universal tetanus will be established by throwing the individual into a perfectly straight position.

When this disease has arrived at its highest stage, as well as in those cases where it is influenced by some one or other of the causes which determine it, as cold for example, we may be further enabled to observe several peculiar symptoms. The patients frequently evince an extreme aversion for liquids, so that when compelled to swallow them, they are immediately seized with the most violent convulsions. This phenomenon was more particularly noticed in the case of M. Navailh, a health-officer of the second class, who died in Egypt of trismus, brought on by a wound which he had received in the face, and which was combined with a comminuted fracture of the bones of the nose and of a portion of the left orbit. Under the circumstances just related, the irritation which is transmitted by the wound to the nervous system, is doubtless augmented by the suppression of the cutaneous perspiration, which irritation extends its effects over the external organs, and

principally over the parts already affected; but, generally, the irritation, from the first attack of the disease, or during its progress, is altogether concentrated in the nerves of the neck and throat. Their immediate connexion with the spinal marrow, their numerous interlacings and frequent anastomoses, render them susceptible, after the slightest impressions, of a very high degree of irritation, which at once determines the contraction of the muscles of these regions, in such a manner that deglutition and respiration become thus forthwith deranged. The patients manifest afterwards, if not a horror, at least an extreme repugnance for liquids, which often impedes the employment of internal remedies; and when the wound is beyond the reach of medical assistance, the individual is condemned to suffer all the pains which that cruel and dreadful disease inflicts. There is nothing whereby the obstacles which obstruct the passage of the alimentary canal can be removed. The introduction, through the nose, of the gum elastic catheter into the oesophagus, is attended by convulsions and suffocation. I have had occasion to try this expedient in the person of M. Navailh and other individuals. Upon opening the bodies of persons who had died of trismus, I have found the pharynx and oesophagus considerably contracted, their lining membranes red, inflamed, and coated with a viscid and reddish secretion.

Hydrophobia, hysteria, and several other nervous diseases equally direct their principal effects to these organs, and their results frequently appear to be the same. I shall not, however, indulge in any remarks upon the analogy of symptoms which these different diseases present.

In every instance, one of the most constant and most severe effects of the causes which produce tetanus, or of tetanus itself, is to induce a more or less extensive phlegmasia, first, in the spinal marrow and nervous system of relation, and subsequently in that of the nerves of organic life, through the medium of the sympathetic and direct connexions which exist to a great extent between the two systems. But still, the proximate cause of death, at the termination of the various tetanic affections, must not be referred to these spinal and nervous inflammations alone, but more particularly to the powerful compress-

ion of the abdominal viscera, to the constraint which the organs of respiration are subjected to, to the contracted state of the heart, and in the last place to the engorgement of the spinal and cerebral membranes. A sufficiently large number of autopsical examinations which, with the utmost care, we have ourselves instituted in different countries, but especially in the hospitals of Louvain, after the battle of Waterloo, of individuals whom we had caused to be dressed under our own eyes, and who afterwards perished from tetanus, have invariably presented to us well-marked vestiges of inflammation in the spinal marrow, with a more or less perceptible effusion of a reddish serum in the vertebral column. Now, as this species of phlegmasia, when once established, aggravates the symptoms, rapidly promotes their progress and would necessarily render them mortal, it is therefore a highly important matter to endeavour to remove it, whilst at the same time, the traumatic cause itself should be attacked by forthwith applying to the vertebral column, the proper depleting revulsives.

After having given a detailed description of the symptoms by which tetanus is characterized, and of the general sympathetic phenomena which they may occasion, we now propose to give an account of the numerous causes which are the subject of its formation, as well as of the influences which the difference of climate exercises in this disease.

To the principal causes of tetanus necessarily belong gun-shot wounds, particularly at the ginglymoid articulations, or at the passage of nerves; comminuted fractures; the presence of foreign bodies which have been introduced or developed, and which puncture or lacerate the tissues; the violent separation of tendons, ligaments, nerves and blood-vessels; the more or less considerable loss of substance in the soft parts, or in the whole thickness of the limb, so as to tear and expose a large number of nervous filaments, which is done, for example, by the larger projectiles, by biscayans, by the bursting of bombs, or cannon balls.

The ligature of the nerves, and particularly of their principal cords; the too sudden impression which, at the moment of the separation of the sloughs, they may receive by coming in contact with the cold and moist air; the too close adhesions

which they may form with the corresponding points of the cicatrix, are also powerful agents, well calculated to give rise to tetanus, to which the undivided attention of the practitioner should be directed, especially as they may begin to operate at the moment when it could be least expected, and when the patient was believed to be out of danger.

Tetanus makes its appearance more generally in young subjects, and sometimes even upon occasion of the most trifling wounds, of which we have seen frequent instances, in Egypt; but in this climate, the moisture and the sudden change of temperature appear to be the chief promoters of it. This may also depend upon the physical or moral disposition in which the patient finds himself, or upon other supervening causes. I have, besides, observed, that this complaint does not commonly show itself in the wounded, although the essential cause should almost always be the same, except during the seasons when the temperature suddenly changes from one extreme to another. The wounded who expose themselves, through the night, to the immediate influence of the cold and humid air which the north-west winds, especially in the spring, so constantly produce, are very apt to contract tetanus, whilst this complaint, on the contrary, but seldom breaks out, when the temperature is nearly equal, in summer and in the winter season. We may, therefore, come to the conclusion that contact with this noxious air, is, to say the least, one of the exciting causes of the tetanic affection, which ought to put surgeons on their guard, and enjoin upon them that, in the treatment and dressing of wounds, in those two seasons, it is of the greatest consequence to do it with the utmost care and gentleness.

The suppression and repulsion of the purulent secretion of the wound, as well as that of the cutaneous perspiration are the first immediate effects of these sudden transitions from heat to cold; and these effects may the more readily excite tetanus in proportion as they themselves come on more rapidly, and as the atmospheric phenomena have exhibited a more or less sudden and decided deviation. Indeed, the wounded who during the Austrian campaign, in 1809, had sustained divers degrees of excessive heat through the day, and were the most exposed to the action of the cold and humid air of the freez-

ing nights of spring, were almost all attacked by this disease which only prevailed during that season, in the course of which the thermometer of Reaumur varied almost constantly from day to night, by half of its rise and fall ; thus, we had in the middle of the day, 19, 20, 21, and 23 degrees above zero, whilst the mercury fell down to 13, 12, 10, 9, and 8 at night. The same variations have been equally well marked in Egypt.

With the causes just enumerated, there is a verminous affection sometimes associated, which cannot, however, prove dangerous by itself; for, at the opening of several corpses, we have found a pretty large quantity of lumbricoid worms which had left no trace whatever of inflammation in the intestines.

Modifications of which the symptoms, accompanying tetanus, are susceptible from a diversity of climate, must certainly be allowed to exist; nevertheless, these modifications are less perceptible than might be supposed, and I may assert that in the different countries over which I have travelled, the symptoms of tetanus have nearly every where presented to me the same analogy. That which prevailed in Egypt, has, generally speaking, appeared to me to be more intense and to resemble much more the attacks of hydrophobia. I have, moreover, noticed that in that country, gun-shot wounds at the passage of the nerves, or at the articulations, have produced it more frequently than any where else, particularly during the seasons which are so extremely changeable, in consequence of their temperature in damp districts and those bordering on the Nile, and on the sea. Dry and irritable temperaments have been in Egypt the most exposed to this complaint, and finally its termination there has been generally fatal.

Amongst the number of the wounded, after the battle of the Pyramids, there were five attacked with tetanus, in whom it was doubtless developed by the dampness and coolness of the nights. It resisted the continued and varied exhibition of antispasmodics combined with narcotics, and taken in large doses; all of them perished on the third, fourth, or fifth day. Their death was preceded by copious sweats.

At the insurrection of Cairo, on the 21st October 1798, the

wounded were received into the hospital, at the square of Birket-el-Fyl, the walls of which were washed by the waters of the Nile, which is stationary there for three months in the year. Seven of their number were seized with tetanus, by which they were destroyed in a very few days, in spite of the continued administration of opiates, of baths of tepid water for some, and of cold water for others. Amongst four of them, it was characterized by emprosthotonus; two died of general tetanus, and the seventh of locked jaw. The whole injury of the latter amounted only to a simple division of the pinna of the right ear, which was caused by a shot. If that portion had been cut off, when the first symptoms began to show themselves, the life of the patient would probably have been saved.

After the engagement of El-Arich, the wounded were accommodated under tents on a damp ground, and exposed to the perpetual rains which we had to endure, during the siege of that fortress. Eight were attacked with tetanus which appeared in all its gradations and terminated in all of them fatally, from the fifth to the seventh day after the attack, notwithstanding the attentions which the nature of the circumstances permitted us to bestow upon them.

At the taking of Jaffa, we lost several wounded in consequence of tetanus of an extremely acute degree. All those who were seized with it died in two or three days. The moxa and the alkalies, which were employed in several instances, seemed to aggravate the symptoms. It must be observed, however, that the hospitals were situated on the sea-shore, and that the season was wet.

From the number and known intensity of the symptoms which the disease, under discussion, originates; from the pernicious and almost indestructible influence of its primary or secondary causes, we may easily account for the resistance which this affection offers to our therapeutic means, and for the rapidity with which it hurries the individuals attacked by it, towards a fatal catastrophe. Experience has, indeed, furnished us with the most convincing proofs, that when tetanus is left to the sole resources of nature, or when it is encountered with a medicine which is almost inactive, the patients are

quickly destroyed. The medical man, therefore, without loss of time, ought to fulfil, as far as possible, all the indications which this disease presents.

Having been placed, during thirty years, in circumstances the most favourable for seeing and observing frequently this baneful affection,—instructed in the true causes of tetanus and the pathological phenomena which it develops, especially in the nervous system, it has been less difficult for me to conduct the treatment of it. Thus, I have met with great success from the employment of several remedies suggested to me by the knowledge of those nervous pathological phenomena, which I have had such frequent opportunities to acquire and confirm after death. By administering, upon the first appearance of the symptoms of tetanus, the remedies which I have deemed most suitable to subdue the causes which produce it, I have often succeeded in removing at once the incidental events which were about to appear.

In those cases where a nerve had been included within the ligature of an artery,\* the division of that ligature (which the wounded signalized as the continued seat of pain, and from whence the nervous irritation seemed to originate) caused the suspension of the disease, and accelerated the healing of the wound. There is no hemorrhage to be apprehended, pro-

\* Although several commendable authors and a great many practitioners are no ways afraid of the effects of a ligature upon the nerves, when they tie the neighbouring arteries, after the operation for amputation or aneurism, I am nevertheless convinced of its possible danger, according to the manner in which it is done, or according to some unforeseen incidents which may accompany it. As to the ligature itself, if it be not drawn so tight as entirely to suspend in the nerve the passage of the nervous fluid, I have constantly remarked some casualties to supervene. In case even where the nerve is completely strangulated, when the parts begin to swell beyond the ordinary degree, these symptoms may come on in consequence of the disturbance which the nerve experiences above the tied point. It is therefore somewhat difficult to meet with a sufficiently favourable circumstance where such a ligature could be applied without occasioning any inconvenience whatever, were it only the acute pain of the moment. After this it will be prudent and wise, to avoid, as much as possible, the ligature of the nervous cords, and particularly so in climates propitious to the development of tetanus. If the circumstances should not permit to avoid it altogether, it ought to be drawn sufficiently tight, so as to operate as a complete constriction upon the nerves.

vided that the vital powers have not been weakened, and that there is no kind of disposition to a state of adynamia; a few hours of immediate compression made upon an artery, till its coats touch one another, often suffice to establish the adhesive inflammation. In order to perform this otherwise pretty delicate operation, a grooved director is to be insinuated between the artery and the loop, after which a thin and narrow scissar blade may be passed along its groove for the purpose of cutting the cord. On five individuals I have had occasion to feel justified to perform this operation, some of whom were threatened with tetanus, whilst in the others the ligature had become identified with the cicatrix, so as to remain there probably for life, of which I have seen several examples, and which is not only troublesome, but even dangerous, because it may be torn off by unforeseen causes.

When I suspected the nerves to be pinched, either by the increase of volume of the neighbouring blood-vessels, or by the adhesion of several points of the cicatrix, I never hesitated for a moment to apply the actual cautery to such a depth, as was necessary in order to reach the injured points of these nerves, and if possible even beyond them. This remedy, so deservedly valued by the physicians of ancient times, has performed miracles. By destroying the nervous adhesions and the twitches which resulted from them, it caused the cessation of the spasm and irritation. It is possible that the share of absorbed caloric may have a tendency to remove the numbness into which the chilling moisture appears to throw the nervous system.

There are besides other essential and more general indications than those of which I have just been speaking, which present themselves, and require subsequently to be fulfilled in a great many instances. They consist in the removal of the causes of irritation and in the re-establishment of the suppressed secretions.

The first of these indications may be accomplished by enlargements, or seasonable incisions, made at the wound, before the symptoms of inflammation have become manifest; for if the latter should already have advanced, such incisions would then

be useless and even dangerous. They must include, as much as possible, all the nervous cords and membranous portions which are injured by the offending cause.

Caustic applications to the wound may be made with advantage, at the time when the first symptoms show themselves, provided the same rule be adopted for their employment which is laid down for that of making incisions. These operations should be followed up by venesection, if it can be done, and by the use of emollient and anodyne local measures, although their effects are generally very feeble. And, in order to prevent or disperse the inflammation of the spinal marrow which we have stated to be one of the leading consequences of tetanus, and in some cases an important and predisposing cause of this disease, scarified cups should be applied simultaneously and repeatedly to both sides of the vertebral column. These may most advantageously be succeeded, as soon as the sanguineous depletion shall have been sufficient, by the application of the moxa, two by two placed upon the same spots after the method pursued by us. The application of this topical revulsive is to be repeated according to the consecutive effects of the inflammation. It will be serviceable to allow the burns to go on to suppuration.

The second indication also may be successfully accomplished by a variety of means. There are the suppurative epispastics, which are prepared by sprinkling upon a pledget, spread with some camphorated balsamic substance, a proportionate quantity of cantharides which previously must have been reduced to powder and exposed to the steam of boiling water; these epispastics when applied to wounds, the suppuration of which is diminished, and the nerves of which, after having been laid bare, have been irritated by the contact with the cold and moist air, prevent and mitigate the effects of tetanus. Being employed upon the appearance of the first symptoms, these remedies restore the diseased nervous cords to their natural sensibility and reproduce the purulent secretions. At the same time the cutaneous perspiration is to be recalled by means of embrocations with very hot camphorated and opiated oil of chamomile. The effects of the latter may be promoted by diaphoretic and alka-

line drinks, by the use of flannels, and by anthelmintics, if there should be reason to apprehend the existence of worms in the intestines. All these remedies have alike produced happy effects, if the exciting cause arose from cold.

Internal remedies, whatever may be their properties, are almost always useless in the treatment of tetanus, because the patient, soon after being attacked with it, falls into a state of strangulation; nevertheless, if this symptom should not become developed till towards the end of the disease, and by degrees only, those remedies may be employed, upon a graduated scale, in which practitioners have had the most confidence, such as opium, camphor, musk, castoreum and the modified alkaline medicines. We have advantageously made use of the above remedies, especially in Egypt, in the cases of some patients whose histories we intend to give below. Amongst the internal beverages which may be given, I have noticed that the patients show less reluctance to swallow emulsions than any other liquids; they are less transparent than pure water, they are sweeter and more agreeable, and promote the effect of the remedies with which they may be combined.

In important wounds of the extremities, with considerable and more or less irregular loss of substance, in those which are accompanied with shattering of the bones and a disorganized condition of the tissues, and in short, in all those which demand the amputation of the wounded limb, this operation, under such circumstances, and in order to avoid numerous mis-haps, is not only indispensable, but has proved by experience to be also the surest remedy by far to avert the tetanic affection. An event as happy as it was unexpected, has even drawn my attention to the extraordinary therapeutic influence of this operation during the existence of that very disease; this is the complete success in the treatment of a case of tetanus which chance procured for me in Egypt, after the amputation of a wounded limb, in the person of an officer who had been attacked by this affection in its chronic form, a result which induces me to propose the following query:

“When tetanus is caused by a wound whereby some part of

the extremities has been injured, the wound, however, not being sufficiently serious to require an amputation, would it not be better to take off the extremity by means of this operation, at the moment when the symptoms are about to appear, than to depend upon the resources of nature and upon uncertain remedies for the cure which so seldom takes place spontaneously?"

Without presuming to solve the important question which has just been proposed by me, I may yet be permitted to venture to produce some reasons which appear to me to militate in favour of the amputation.

As soon as it is clearly ascertained that tetanus has been induced by the wound, there can be no longer any doubt about performing this operation, at the moment of the appearance of the symptoms. That it is traumatic may be learned from the nature of the wound; from the progress of the first symptoms, and from the consideration of the period of their invasion which takes place from the fifth to the fifteenth day, at farthest. It would seem that this is the moment when the nervous irritability is very great. When the process of suppuration has commenced, when the stupor is speedily relieved, the vessels unload themselves, the sloughs separate, and the nerves find themselves in a state of perfect ease; then their sensibility is extreme, and they are susceptible, on the most trifling impressions, of the highest degree of irritation, which quickly communicates itself to the whole nervous system. If, under such circumstances, the wound is acted upon by a cold and moist air, or if some foreign body should happen to remain there, pricking the nervous parts which are now isolated from their sloughs, tetanus is inevitable, particularly so in hot climates. This disease afterwards may be expected to be rapidly on the increase, so that in very little time all the parts of the limb become involved in it and all the nerves irritated. The effects of this first cause may be complicated, also, by the presence of worms in the intestines, of which I have witnessed an instance at Nice; but, by watching attentively the phenomena of tetanus, the symptoms which characterize these less important complica-

tions may be readily distinguished and subdued by the remedies indicated.\*

The amputation of the limb, when performed during the first moments after the appearance of the symptoms, suspends every communication of the source of the complaint with the remainder of the individual: this division unloads the vessels, causes the cessation of the nervous twitches, and destroys the convulsive motion of the muscles. These first results are followed by a general collapse which promotes the excretions and sleep, and re-establishes the equilibrium throughout the whole system. The amount of momentary pain which is caused by the operation cannot increase the existing irritation; besides, the pains of tetanus render those of the operation more easy to be borne, and diminish their intensity, especially when the principal nerves of the limb are powerfully compressed.

The great wounds with or without loss of substance, even those which are the result of amputation of a limb, though they may be followed, at times, by a tetanic affection, do not prove that the extreme remedy which I propose for this disease should be dangerous, or that it should not be attended rather with beneficial results. I have just attempted to assign my reasons for it. When tetanus has supervened after amputation it is certainly not this operation which has been its exciting cause; agents entire strangers to it have simultaneously operated and through their sole influence directed the tetanic phenomena, and these agents which we have already pointed out as the most common causes of this disorder, particularly in hot climates, have been the action of a cold and moist air upon either accidental or surgical wounds; the irritation developed by the presence of foreign bodies; the ligature of a nerve included within that of an artery; and finally the suspension of the flow of purulent matter.

In those instances, otherwise quite rare, of amputations, where a tetanic affection has been observed to make its appearance, the action of cold or of a ligature upon a nerve has most

\* The sweet and fresh oleum ricini, prepared from the kernels of the palma christi of America, and combined with a few grains of calomel, is the most simple remedy for the verminous disorder.

frequently contributed to its origin, and experience as well as reasoning have taught me the manner in which those causes operate in order to produce this disease. Many years ago I had perceived that the extreme ends of the nerves, divided in the amputation of the limbs, enlarged considerably and formed each a kind of head, from which filaments, infinitely fine and divergent, appeared to grow, destined no doubt to transmit sensation and vital action to the cicatrix of the stump, which was itself composed of a great many vessels amongst which those small filaments have appeared to me to become lost. At any rate the existence of these vessels has been demonstrated by the beautiful injections of Doctor Sœmmering. Guided by this information it is easy to form an idea of the effects of cold or other sensible changes of temperature upon the thus modified nervous extremities, and consequently to explain the development of tetanus. If, on the contrary it should supervene from the constriction of a nerve by ligature, it is supposed that a spasmodic action is then about to be established which spreads rapidly from the extremity of the divided nerve to the neighbouring ramifications, thence to the branches and successively to the trunks, so as to invade the whole nervous system, with the exception of the brain, as we have had occasion already to observe. I have had frequent opportunities to convince myself of the exactness of the physical changes which are brought about in the nervous extremities which have been divided or compressed. Upon examination\* of the bodies of two individuals who had been amputated and fallen victims to the con-

\* The same phenomena we have also very well observed in the son of General Darmagnac, a young officer of singular courage and intelligence, one of the wounded at the battle of Eylau, and in whom tetanus terminated fatally. I saw him in the last stage of the disease which had supervened, after the amputation of the arm. At the dissection of the stump, twenty-four hours after death, we, M. Ribes and myself, found the median nerve included within the ligature of the artery. The extremity of this nerve was tumefied and reddish.

"I have not had the happiness to find you on the field of battle, Monsieur Larrey, said the young warrior to me; and now your attentions are of no avail. I have terminated this glorious career, which I had scarcely commenced. Tell my father that I die worthy of him, and convey to him my last farewell. . . . on the brink of the grave." Whilst uttering these last words, Darmagnac made an effort to turn himself, and expired.

sequences of tetanus, during the Austrian campaign, we noticed in one of them, whose arm had been amputated, the median nerve which had been included within the ligature of the brachial artery, puffed up like a mushroom below the ligature, and much swollen above it, and of a reddish colour; in the other who had been amputated nineteen days previously, we likewise noticed the nerves puffed up at their extremities and adhering to the surrounding parts. These states of nervous turgidity have already been met with by several anatomists.

Finally, however, for the same reason for which under ordinary circumstances these effects ought to be remedied, it will be easy for an attentive surgeon, after he may have decided upon the amputation of a limb for the purpose of curing the tetanic affection, to anticipate and prevent, in this last event, the approach or influence of the causes which we have just now dwelt upon. This object may be attained by keeping the wounded in a temperature sufficiently warm, and as far as practicable, always equal; by taking care promptly to extract all the foreign bodies, to dress the wound gently, to cover it forthwith with fine and perforated linen, and not to take off the first dressing of recent wounds, till suppuration is fairly established and even then as late as possible. Finally, the patient is to observe a strict diet and the most absolute rest.

There will be found at the end of this work,\* some observations on the success attendant upon the amputation of the wounded limb in the cure of tetanus, and on the care with which the causes ought to be guarded against, which, subsequently to that operation, might result in a new tetanic affection. Although I must regret that I have been unable to exhibit a larger number of cures, I have yet a sufficiency to warrant the conclusion that timely amputation seems to me to be the surest means to arrest and destroy the consequences of tetanus, if the latter depends upon a wound situated at the extremities.

Without, at present, stopping any longer at the theoretical exposition of the phenomena, occasioned through traumatic

\* See *Clinique Chirurgicale*, Vol. III.—*Translator.*

tetanus, but intending to recur in a still more conspicuous manner to all the symptoms to which it gives birth, to all the modifications which are caused in this disease by climate, seasons, and by other circumstances, as well as in order to justify the principles which we have laid down and the new remedies which we have indicated in the course of our work, we propose to relate a series of cases, collected during our numerous campaigns. In comparing these cases with the general account which we have just given of the disease, there will be occasion also sometimes to record interesting observations either upon the causes, or the pathological phenomena, circumstances of which I have not as yet spoken, because their relation appeared to me more properly placed amongst the particular facts which caused them to be displayed.

*Cases of Partial and General Tetanus.*

Peter Genet, a sergeant of the fourth half-brigade of light infantry, aged 30 years, of a dry and bilious temperament, entered the hospital (a farm of Ibrahim Bey, in Egypt) on the 4th of October 1800, with every appearance of opisthotonus; his jaws were locked, the muscles of the face convulsively and permanently contracted, the head thrown back upon the trunk, the lower extremities rigid and extended, the walls of the abdomen contracted and approximated to the vertebral column, the pulse small, respiration laborious, deglutition and speech difficult.

The complaint, which had broken out twenty-four hours before entering the hospital, appeared to have no other cause but a fall upon the nose, five days previously, which was attended by some slight epistaxis and a trifling excoriation of the part. There was not the least sign of fracture, or of concussion of the brain.

Blood-letting, opiates, cooling drinks and anodynes, tepid baths and emollient applications to the nose were immediately administered. No beneficial result having been produced by the repetition of these remedies, I requested the health-officer who had the particular charge of the patient, to apply the actual cautery over the passage of the facial nerve, and to the soles of the feet; according to the aphorism of Hippocrates, section viii,

Quæ ferum non sanat, ea ignis sanat, &c. I put on nine sufficiently large and incandescent irons. Their application instantly augmented the pains and the convulsive contractions of the muscles. Those of the larynx, the pharynx and of the parietes of the mouth were violent and had nearly suffocated the patient; nevertheless, that crisis was followed by some rest, sufficient to inspire us with the hope of some success from the employment of this remedy. But two or three hours afterwards, convulsive motions, violent contractions, cold and clammy sweats made their appearance; at length in the night of the 10th to the 11th December, death terminated the torments of the unfortunate man, the seventh day after the attack of tetanus.

Notwithstanding the unsuccessful issue, after the application of the actual cautery, in the instance just read, I have since become convinced that this remedy is capable of producing the happiest results, especially if immediately applied to the wound which induced the tetanic affection. We are going to relate several cases, by briefly stating at the head of each of them the pathological phenomena for the cessation of which we had advised it.

#### *Cases of the Ligature of a Nerve and of the Influence of the Cold and Moist Air.*

Charles Yonck, a fusilier chasseur, after having undergone the operation of amputation of the right thigh, on account of a most extensive shattering of the knee by a cannon ball, about the eighth or the ninth day was attacked with tetanus. The irritation and nervous spasm emanated, according to the statement of the patient, from that point which corresponded with the ligature of the blood vessels. The suppuration was diminished and had become sanious. We employed for the dressings the unguentum epispasticum;\* we prescribed hot, oleaginous and

\* The *unguent. epispast.* is a combination, in the liquid state, of equal parts, say one ounce each, of the unguent. basilicum and unguent. populeum, with the addition of eighteen grains of powdered cantharides. The *unguent. populeum* is composed of the young shoots of the black poplar, of suet, of the fresh leaves of the black poppy,—of the belladonna, of *hyoscyamus*, and of *solanum nigrum*.—*Translator.*

camphorated liniments over the entire surface of the body, and diaphoretic and opiated draughts in large doses. All these remedies, which were carefully administered for three days, scarcely retarded the progress of the disease. Suspecting that one of the principal cords of the crural nerve was included within the ligature of the femoral artery, which had not yet come off, I cautiously introduced by means of a grooved director the point of one of the blades of my scissars, betwixt the artery and the knot of the thread, which I cut through with facility. This simple operation appeared to compose the tetanic symptoms for the space of a few moments, but the irritation had extended too far, and I am of opinion that the principal exciting cause was the impression of a cold and moist air to which the patient had been exposed during a stormy night, after having suffered from the extreme heat of the preceding day; this bleak air, however, had irritated the extremities of the divided nerves.

The symptoms steadily went on increasing, and deglutition had already become difficult, when I decided upon the application of the red hot iron to the entire surface of the stump. I burnt down upon the whole extent of the wound. Several hours afterwards, although the operation had been very painful, to my great surprise, a marked improvement became perceptible. The jaws, which had been locked, could be opened at pleasure, and deglutition was more easily performed. The rigidity of the muscles gradually disappeared; the suppuration of the wound became re-established, and the sloughs produced by the cautery separated in succession. The cicatrization of this wound commenced from the circumference towards the centre, and before the expiration of the second month, Charles Yonck was completely restored. The use of camphor, opiates, and diaphoretic drinks had not been discontinued.

Another, of the name of John Weisse, whose left thigh had been amputated, was attacked with the same complaint on the fifth day after the operation. We successively employed all the above remedies. The actual cautery was the last, of which the first application was sufficient to disperse all the symptoms of tetanus.

*An Instance of Nervous Laceration, and of the Utility of Incisions.*

Upon the occasion of a charge of cavalry, M. Markeski, a lieutenant of a regiment of light horse, received, whilst in Austria, a thrust with a lance on the right side of the forehead. The point of this weapon had entered obliquely from below upwards and inwards under the pericranium, so as to produce a deep fissure in the substance of the frontal bone. One of the branches of the frontal nerve had been grazed (*eraillé*) by the cutting edge of the lance. In the night of the ninth until the tenth day, tetanus was ushered in by convulsive motions in the eye-lids of the corresponding eye and by loss of sight in that organ. There was also some slight aberration of the mind. Emollients applied to the seat of the injury, and the exhibition of diaphoretic and opiated draughts produced no effect whatever; the complaint went on increasing, and there was no doubt that, before the expiration of twenty-four hours, it would have arrived at the highest stage.

I sounded the wound and readily discovered its whole course; the passage of my probe caused the patient the most acute pains. These motives determined me to divide, with a bistoury, the entire substance of the corrugator supercilii muscle, and the injured nerves and blood-vessels distributed to it, which was accomplished by a single incision from below upwards.

This officer experienced immediate relief, and in less than twenty-four hours all the tetanic symptoms were dispersed and vision was completely restored. I had reason to hope that the patient's recovery would not be interrupted by any other obstructions; however, on the twenty-fifth day after the wound, symptoms of effusion and of inflammation of the brain and its meninges suddenly appeared, which symptoms the pre-existing aberration of the mind could not have failed to make me suspect as uncommon to tetanus; yet it is proper to mention that, till then, I had discovered only a very small furrow at the external table of the frontal bone, which had been produced by the point of the lance. The application of a large blister to the base of the cranium and the administration of cooling

and antispasmodic drinks did not prevent the aggravation of the complaint. The fever again broke out, delirium supervened, and the patient died on the twenty-seventh day after the wound.

On opening the cranium, we found towards the extremity of the fissure, a lamina of the internal table of the frontal bone loose, a considerable effusion of a bloody purulent matter underneath the anterior right lobe of the brain, and this latter portion of the encephalon in a state of suppuration. At the invasion of the first symptoms of compression which had succeeded those of tetanus, I did intend to apply the trephine to this fissure, but I was dissuaded from it by several of my colleagues, who, from the smallness of the fracture, could not believe in the existence of the effusion.

*Cases of Nervous Compression and Turgescence occasioned by the Adhesions of the Nerves to the Cicatrix of the Wound.*

In Francis Demaré, a grenadier, a bullet in the strength of its career, carried off the skin, a portion of the spine of the right scapula, and parts of the trapezius, supra and infra spinatus muscles. The division of the strangulated aponeurotic adhesions, and the excision of the disorganized fleshy masses, was performed upon the field of battle. The extraction of several bony fragments was likewise accomplished, and the wound was covered up with fine perforated linen, with charpie and a suitable dressing.

The first stages of suppuration had passed over without the slightest paroxysm, and the wound began to cicatrize already from the circumference, when suddenly tetanus broke out, and with the rapidity of an electric spark, travelled over the whole nervous system, so that in a very few hours opisthotonus was completely established. I immediately gave him diaphoretic drinks, and ordered him to take opiates in large doses. Camphorated and narcotic oleaginous lotions were applied over the whole surface of the body. The dressings were mild and far apart; in short, every care and every remedy were lavished upon him. The purulent secretion being

suspended, the cicatrix made rapid progress, and in forty-eight hours it covered half the wound. The patient now began to feel a painful and troublesome pinching in all the cicatrized places; he experienced, so he told us, the same sensation as if the edges of the wound had been seized with pincers; and the least touch of this very thin cicatrix, particularly the contact with metals, such as iron, steel, &c., made him utter violent screams. All the symptoms of tetanus became sensibly aggravated; the upper extremities had acquired an extreme rigidity and were drawn backward; the cervical vertebræ were completely turned out, and deglutition was out of the question. In vain was the extraction of two incisor teeth performed, for the purpose of admitting through it the sucking bottle; he could no longer pass a drop of fluid into the œsophagus, and the approach of limpid water excited convulsive motions; the patient entertained the utmost aversion for it. During these critical moments the froth from the saliva accumulated, and all other symptoms arrived at the highest pitch. At length this ill-fated individual, who had not as yet shown the slightest sign of mental aberration, drew nearer the termination of his existence, and would probably have expired within twenty-four hours, if I had not taken the resolution to employ the actual cautery. I therefore caused four large and thick cauterizing irons to be heated red hot, even to incandescence, which I without intermission applied one after the other to the whole extent of the wound, in such a manner that they bore with most force upon those points of the cicatrix, where I suspected several branches of the spinal accessory of Willis to be pinched and tumefied. This operation was exceedingly painful; nevertheless I had the courage to continue the application till every spot of the wound was deeply and completely burnt. I had scarcely accomplished it, when an almost general relaxation took place, which was preceded by a copious perspiration. The patient raised himself of his own accord, and asked for something to drink. The jaws separated spontaneously; I gave him a glass of the nitrated milk of sweet almonds, to which I had added sixty drops of laudanum, and a few drops of Hoffman's anodyne liquor. I directed the camphorated narcotic

liniments to be repeated, and the body to be wrapped up in very warm flannels. The sweat became abundant; and a complete composure, accompanied by a profound sleep of several hours, was obtained. The next morning I found the patient free from all tetanic symptoms; there remained hardly any stiffness in the jaws and the spine. The dressings were simple and gently applied. The sloughs separated about the ninth or the tenth day; the cicatrization recommenced soon after, unattended by pain. After his entire recovery nothing remained but some constraint in the motions of the shoulder and of the arm of the same side. This is one of the most remarkable cures in military surgery.

James Lucas, a fusilier grenadier, had the calf of his left leg shot off by a bullet which struck him whilst in the strength of its career; he was dressed on the field of battle under the same precautions as the preceding individual. The wound had already begun to cicatrize, when it was overtaken by the supervention of tetanus. We had equally recourse in this case to all the remedies of which we have spoken, insisting especially upon the exhibition of opium in large doses. Opisthotonus became, nevertheless, developed, and advanced to the third stage, though in a slow and gradual manner. A few days afterwards the jaws closed and deglutition became more and more difficult. Being already convinced of the inefficacy of the above cited mode of treatment, I hesitated no longer to apply to him the actual cautery. I obtained a result almost as happy as it was prompt; there remained only a slight constriction in the jaw, and some stiffness in the spine and in the affected foot and leg. After the sloughs from the first application of the cautery had fallen off, I repeated it a second time, whereby all the tetanic symptoms were completely subdued. All that yet remained to be done was the cicatrization of the wound, and this was in a fair condition; but, in consequence of an excessive debauch, the patient was attacked with a slow fever and gangrene of the leg: from that period the success of my measures was defeated, and this soldier soon afterwards perished a victim to his own imprudence. It is evident that the tetanic affection was completely cured.

Another soldier had the index finger of his right hand ex-

tirpated at the metacarpo-phalangial articulation by a shot received by this finger in the battle of Esslingen. A vexatious hemorrhage from one of the digital arteries compelled us to apply a ligature to the bleeding vessel, in which the nervous branch accompanying it was included. Several days elapsed without any symptom, and the cicatrix was nearly formed, when tetanus manifested itself. I hastened to cut off the ligature which had not yet become loose. This operation made no change in the condition of the patient. The disease even continued to increase, and to threaten his existence. Under these circumstances I applied the actual cautery to the short stump as far down as possible, which, as if by enchantment, caused the disappearance of all the tetanic symptoms.

*Cases of Tetanus treated principally by internal remedies.*

A Mameluke of Mourad Bey, of the name of Mustapha, aged twenty-seven years, of a dry and bilious constitution, received a gun-shot wound on the 19th April 1800, which shattered the first phalanges of the fingers of his right hand, the corresponding metacarpal bones, and carried off the thumb at its articulation with the trapezium: several tendons or ligaments were torn off or lacerated. Every attention which had been shown him, being administered without knowledge, had been of more harm than use, so that Mourad Bey, on 18th May following, sent him to the French surgeons, and requested General Donzelot to recommend him to their especial care.

All the symptoms of tetanus had been established for three days; the suppuration of the wound was serous and scanty; its margins were red and tumefied; the muscles of the arm already contracted and in a state of convulsion; the jaws locked; deglutition was painful; the patient was constipated and very restless.

The first care of M. Cellières, surgeon of the second class to the hospital of Syout, was to enlarge the wound and to extract cautiously the loose fragments; he next dressed it with emollients, and made the patient take six grains of opium combined with four of camphor. A few hours afterwards he became somewhat composed, and in the course of the succeeding night was less excited. This improvement induced the sur-

geon to continue with the same remedies, the dose of which he merely increased. The symptoms sensibly abated until the 24th May, when the patient was taken away from Syout to Minyet; but the burning heat of the day, the fatigue of the journey and the coolness of the night, during which he exposed himself by lying on the terrace of the hospital, recalled the tetanic affection. The same remedies were continued, but did not prevent the complaint from progressing with its usual rapidity. Baths of tepid water were tried; the second of which produced a general relaxation, which enabled the patient to swallow the one half of a draught composed of eight grains of camphor, eight grains of musk, and twenty grains of opium dissolved in a glass of emulsion; the other half was taken in the course of the day: a few moments after which the pains subsided and the jaws relaxed, and through the night his slumbers were sufficiently quiet. The next morning a great improvement became manifest; the suppuration of the wound had become re-established; the organs gradually resumed their functions, and a few days more sufficed to put the Mameluke in a fair way of recovery. On the 29th June he was, at length, in pretty good condition, and returned to the prince Mourad Bey.

General Lannes received, in the battle of Aboukir, a shot which traversed his leg at its lower extremity in the space between the two bones. He was immediately attended to under the tent, and subsequently transported to Alexandria, when unpleasant symptoms began to appear. At the moment he sent for me, his leg was tumefied and the wounds dry and painful; he had subsultus tendinum, violent twitches throughout the whole limb, and the foot was benumbed; his voice was hoarse, the jaws pretty nearly closed, the eyes haggard, and the fever was raging. I dressed him with emollients and prescribed for him cooling drinks, absolute composure and diet. On my second visit, three hours afterwards, all the symptoms were still more aggravated; I ordered him instantly to be bled from the arm and put him upon the use of emulsions, to which I added the putrified nitrate of potash, Hoffmann's anodyne, the syrup of poppies, and orange flower water, in proper doses, a glass full to be taken every

quarter of an hour; the topical emollients were continued. The night was passed in pain; the next day the patient was in the same condition and the leg greatly inflamed; he swallowed with difficulty, and the jaws were continually locked. I directed another venesection, whilst the same remedies were continued, with an increase of the dose of the antispasmodics. The following night was tranquil, the fever diminished, and all other symptoms abated and continued to decline: a sanguineous discharge unloaded the wounds and the leg, the spasm ceased entirely, and the suppuration became healthy and abundant; the excretions resumed their natural course, sleep was restored, and shortly afterwards he was in a fit condition to return to France with the general in chief, Bonaparte.

M. Croisier, aid-de-camp to the general in chief, perished with tetanus in the deserts of Catyeh on our return from Syria, in consequence of a similar wound.

M. Esteve, director general and comptroller of the public revenue of Egypt, was attacked with a slight inflammatory quinsey, brought on by a portion of fish bone which had become lodged in one of the sinuses of the pharynx, where, from its smallness, it had escaped all my researches after it.

On the thirteenth day after this occurrence, and the third after inflammation had been established, strong symptoms of tetanus became developed. From that moment I put the patient at once upon the use of a sweetened emulsion, with which I combined, in sufficiently strong but graduated doses, the extract of opium, castoreum, camphor, the purified nitrate of potash and Hoffmann's anodyne, of which he took a glass every quarter of an hour. The weak state of his pulse did not permit me to make use of blood-letting. I applied di-  
cutient cataplasms to the anterior surface of the neck; I directed pediluvia, emollient clysters, the inhalation of the steam of a strong decoction of hyoscyamus, poppy, and althaea root, dry frictions over the entire surface of the body, and finally I caused every thing to be removed which could trouble his repose.

Step by step I followed up all the phenomena of the disorder.

He was much excited during the night; the pains were violent; deglutition ceased; the saliva ran out of the mouth; the jaws were firmly closed. The patient underwent a painful and perpetual agitation; now and then he fell into a doze which was interrupted by slight fits of phrenzy; in short every thing announced imminent danger. However, towards four o'clock in the morning, a gentle and copious perspiration on the chest and abdomen succeeded that violent crisis: the patient became composed, and was enabled to swallow a glass of the emulsion above mentioned. The second glass increased the perspiration and relaxation of the parts, which induced me to draw a favourable inference from its effects; for, when the perspiration is symptomatic, it commences by the head and extremities, but, when it is critical, it breaks out on the breast and abdomen. The next day the jaws were completely relaxed, deglutition was easy, and the muscular contraction considerably lessened. I substituted volatile liniments for the discutient cataplasms, and a bitter and purgative ptisan, instead of the emulsion, with a view to unload the primæ viæ and to establish the healthy action of the stomach. A few days after, M. Esteve was perfectly cured. The fish-bone seemed to have been removed by a moderate suppuration which had been set up in the pharynx.

Oleaginous frictions, recommended by some writers, have been employed in Egypt, but without operating the least change in the nature of the disease.

Mercurial frictions have appeared to me only to aggravate the symptoms in those to whom they were applied. The employment of this remedy, even when used in venereal diseases, requires, in Egypt, the utmost precaution; for this remedy, when administered after the European fashion, has produced there disastrous consequences, such as insanity, hepatic disorders, &c.

Cataplasms made of the leaves of tobacco for the wounds of those persons who have been attacked with tetanus, have not produced any favourable result whatever. And the alkalies have been employed equally without success.

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*Cases of Tetanus in which some peculiar phenomena had appeared.*

A soldier of the 75th regiment of the line, having received, during the Austrian campaign, a gun-shot wound of the right thigh, was attacked with tetanus. Cold baths, recommended by some physicians, were employed. The two first occasioned to the patient a most painful feeling, without improving his situation in the slightest degree. At the sight of the third he felt an invincible horror for the water in the bathing tub, into which he refused to go; a bed-sheet, however, was thrown over him, and without giving him previous notice, he was plunged into the water. He had scarcely been immersed in it, when the tetanic rigidity increased and he was seized with dreadful convulsions. It became necessary to take him instantly out of the bath and to bring him to bed. A tumour of the size of a hen's egg appeared suddenly along the edge of the linea alba below the umbilicus. The life of this unhappy man was protracted yet for several hours, but towards the end of day all his functions were precipitately suspended, and the next morning he was found dead. His intellectual faculties had remained sound throughout.

I opened the body of this soldier in the presence of the two surgeon majors, M. M. Galette and Trachet, his physicians. The whole body was as stiff as a board and completely straight, which is a characteristic sign of general tetanus. The tumour which we had observed near the linea alba was still perceptible; the walls of the abdomen were glued upon the vertebral column, and the jaws were firmly locked. After having made a crucial incision through the integuments of the abdomen, we laid open, by a well directed dissection, the parts which constituted the tumour. It consisted of a portion of the rectus muscle of the right side, retracted upon itself in the shape of a ball of cotton, this being the result of a rupture of this muscle throughout its whole substance. The rent, indeed, might be perceived underneath, and was filled up with blackish and coagulated blood. The rupture of this muscle, although very extensive, must have been spontaneously produced at the moment when the patient was plunged into the cold bath. The abdominal viscera were

reduced to an exceedingly small volume and had descended into the hypochondriac regions and pelvis. We met with some lumbricoid worms in the small intestines, but not the least sign of inflammation. The ventricles of the heart were empty and its parietes approximated each other. The brain presented nothing particular. In the dissection of the wounded thigh we discovered the bullet, adhering to the linea aspera of the os femoris, near the great trochanter. The crural and sciatic nerves had been injured by the entrance and passage of the bullet; and it is no doubt owing to this twofold lesion that tetanus was occasioned.

A fusilier chasseur who in the same campaign had a portion of the tarsus of the right foot carried off by a three pound ball, had been seized with tetanus, when I recommended to him the propriety of amputating the leg, which the very nature of the injury required. But he declined the operation, and I was compelled to confine myself to the use of opiates, diaphoretics and camphorated narcotic liniments. The progress of the symptoms became slower, and the affection assumed a chronic character, that is to say the general stiffness remained nearly of the same degree. The wound also was almost always without suppuration, in spite of the application of suppurative epispastics. The complaint, however, increased imperceptibly, and emprosthotonus became established. The patient at the same time felt a smart pain in the right elbow of the same side of the wound; in addition to which swelling, redness, and all the symptoms of local inflammation supervened. Anodyne emollient cataplasms were applied, and the dose of the narcotics increased, because of the steady progress of tetanus which threatened the life of the subject. To the symptoms of inflammation succeeded those of suppuration. The very rapid formation of an abscess took place above the articulation, and the fluctuation becoming evident, I forthwith opened it, and let out a large quantity of greyish purulent matter. From that moment this soldier decidedly improved; the rigidity of the body and its limbs disappeared almost immediately; his jaws relaxed and he swallowed with ease all the medicines which were ministered to him; finally, all the tetanic symptoms

had entirely disappeared. The wound of the foot, as well as that of the abscess, afterwards advanced without hindrance in the process of cicatrization, and I anticipated a speedy recovery of the patient, when he was seized with an attack of complete paralysis of the whole affected side, and somewhat later with a dysentery which in a few days caused his death.

It is self-evident that the abscess subsequent to the injury of the foot, which supervened upon the arm of the same side, as also the hemiplegia which followed it, were the results of a purulent metastasis, and that the issue of the matter of the abscess constituted the crisis of tetanus. The paralysis alone remained, and would no doubt have been removed in the course of time, if the patient had survived this crisis.

*Case of traumatic tetanus excited by the coolness of the nights, and aggravated by a moral affection.*

General Daumartin, whilst descending the Nile in order to repair to Alexandria, received four slight shots, one of which went to the right leg, another to the left thigh; the third grazed his chest, and the bullet of the fourth entered into his right arm; the former affected only the integuments and a very small portion of the muscles. The general obtained no assistance until his arrival at Rosetta, which occurred on the fifth day after the event. M. Guillier, surgeon major, dressed the wounds according to the principles of the art, put him upon a strict diet and on the use of cooling beverages. A few days afterwards, the bullet was extracted by him, it having shown itself near the articulation of the elbow.

The wounds were in good condition, and without the anxieties to which the patient had given himself up, an early and safe recovery might have been expected; but his moral emotions gaining daily more and more the ascendancy, some apprehension of an attack of tetanus was entertained. Indeed, on the eighth day after the accident, the suppuration of the wounds was considerably diminished, and the dressing of them, though made with the utmost precaution, was very painful. The next day all the symptoms of tetanus were fully displayed; they

travelled rapidly, and terminated fatally on the fifteenth day after the infliction of the wound.

The termination of the disease, perhaps, might have been less fatal, if upon the appearance of the first symptoms, the arm had been amputated.

*Cases of the advantages arising from the amputation of the injured limb in tetanus.*

M. Bonichon, a lieutenant of the first battalion of the 21st half brigade of light infantry, had, in the battle of Sedment, received a shot in the left foot. The direction of the wound was obliquely from behind forwards, passing across the instep, of which several of the bones were fractured; the extensor brevis muscle of the toes and the corresponding articulating ligaments were ruptured. Nevertheless, on his arrival at the hospital, October 7th, 1798, no unpleasant symptom had as yet presented itself; the first dressings had been carefully made: the wound having been enlarged, several fragments had been extracted.

On the same evening the wounded showed some anxiety; his sleep was disturbed; he felt acute pains in the wound which continued increasing, until I visited him in the morning; the edges were then found tumefied, and encircled by a reddish streak; suppuration was suppressed; the act of dressing occasioned pain. Cooling drinks and anodynes, and the application of emollients to the wound did not, for several days, produce any effect whatever.

On the 19th of October, the jaws first began to be locked; on the 20th, all the symptoms were developed, and from that time assumed a chronic character, till the 2d November, when the disease had reached the highest degree. His legs were stiff and firmly bent upon the thighs, and the latter upon the pelvis; the walls of the abdomen were glued to the vertebral column; the head bent upon the breast; the jaws firmly closed, and deglutition difficult. The pulse was small and tremulous (*nerveux*); the patient reduced to a state of extreme emaciation, his body being constantly covered with perspiration; he complained of continued violent pains which made him anxiously look for his dissolution as for a blessing.

Having vainly tried all the resources which under such circumstances the art of healing has to offer, opiates in all its forms, combined with camphor and bark, lotions of cold water, solutions of opium applied to the wound, emollient cataplasms, I now conceived the idea of amputating the leg. The despondency of the unfortunate man, and the certainty of death which awaited him, determined me, against the advice of several officers of health, whom I had desired to meet in consultation, promptly to resort to this last remedy. A moment of calmness which presented itself in the course of the day, was taken advantage of for the occasion. The operation was dexterously performed under my eyes and in presence of all the consulting physicians, by M. Assalini, a surgeon of the first class. The patient, who had desired it, bore it courageously, without evincing any great pains. A slight syncope, supervening a few moments after the operation, was the happy forerunner of the cessation of the symptoms: indeed, a general relaxation, which allowed the patient to swallow some fluids, was the immediate result. He passed a quiet night and had a few hours' sleep. On the next day, I found the pulse developed, the limbs less rigid, the jaws relaxed. The patient, aided by some injections, had several stools. The wound began to suppurate at the ordinary period, and all the symptoms disappeared by degrees; but, still the stump continued for several days to exhibit violent subsultus, which increased even by the slightest external touch, especially so during the act of dressing, notwithstanding the precautions which were taken not to irritate the parts in any manner. I succeeded in quieting these convulsive motions, by means of a pretty accurate compression which I directed to be made upon the course of the sciatic nerve.

He soon recovered his strength, but the digestive faculties for a long time remained in a state of atony, owing to the pressure which the muscular walls of the abdomen had exerted over them. In December, however, this officer was completely restored, and began to walk on his wooden leg. Shortly afterwards he, with other invalids, departed for France, and was admitted into the Hospital of Invalids at Paris.

The battle of March 21st, 1801, gave me an opportunity to

cause an amputation of the leg to be performed on a soldier, for a wound similar to that of M. Bonichon. Although the tetanic affection had already become established, and that of an acute character, still the operation, as if by enchantment, put a stop to all the symptoms, and had it not been for the dampness of the ward where the patient was accommodated, and for the absolute want of the proper means to defend him against the chilliness of the nights, it would doubtless have been attended with an equally successful result. He passed about twelve hours in a comfortable and easy condition, but the chilliness of the following night, more severe than common, revived the symptoms, which resisted all the indicated remedies, and the patient died on the third day after the operation.

Similar results obtained also in the case of a soldier attacked by tetanus, in consequence of a gun-shot wound of the elbow joint which he had received during the siege of Saint Jean d'Acre.

At the time I saw the patient, the symptoms had already advanced; the amputation, however, of the arm which I directed to be tried, was followed by a state of rest sufficiently great to inspire me with some hope of success; but, having been unable to defend him against the chilliness of the nights, and tetanus making too great and severe inroads, the symptoms several hours afterwards made their appearance again, and he perished likewise on the third day after the operation.

Of the three cases which I have just related, the operation for amputation was attended with the most success in the subject of the first, because there tetanus had assumed already a chronic form. This circumstance, indeed, holds out the greatest chances of a successful issue, because the moments of intermission, between the fits, may then be better selected for this operation, whilst in acute tetanus the career of the disease is altogether more rapid, more intense and less intermitting.

In all instances it is owing, as we have said before, to the disgorgement of the vessels and to the division of the nerves, that an amputation causes the cessation of the tetanic symptoms; so much so, that although there was, on the individual of the following case, no operation performed embracing the entire

structure of the limb, I shall relate it notwithstanding, as a proof of the beneficial effects which amputation is capable of procuring.

General Destaing, whilst in Egypt, received a wound from a bullet which passed through the middle, internal, and posterior part of his right arm. A portion of the biceps and coraco brachialis muscles, as well as the radial and cutaneus internus nerves were imperfectly cut through. This wound left a bridge of several lines which was formed by the integuments, the cellular tissue and some loose fibres.

Although suppuration had already commenced when I first saw him, he felt smart pains in the wound; his appetite was impaired, sleep disturbed, and towards evening some febrile action manifested itself. I immediately perceived the necessity of dividing the bridge which contained some nervous branches of the cutaneus internus; but the patient declining to submit to this simple operation, I was compelled to restrict myself to the application of emollients and to the internal exhibition of such remedies as were indicated. On the following day the local pains were more active; there were convulsive motions in the hand and fore-arm; heat throughout the whole body, and closing of the jaws. The patient was extremely restless and continually agitated. The rapid strides with which the symptoms progressed, determined me to divide the bridge and make an incision to the bottom of the wound, where I found several nervous and aponeurotic filaments.

Painful as this operation was, the patient felt, two hours afterwards, greatly relieved, and so continued. The suppuration was in good order; the wound assumed a clean aspect; the edges subsided, and the cicatrix formed in due season.

*Instances of the Efficacy of the Remedies best calculated to ward off the Tetanic Symptoms which are likely to result from an Amputation.*

Bonnet Pierre of the 85th half-brigade, aged twenty years, of bilious and irritable temperament, had languished ever since the campaign in Syria, in the hospitals of Cairo, on account of a fistulous ulcer with caries of the bones which form the artic.

ulation of the right foot with the leg. The disorganization of the parts, and the state of marasmus to which this soldier was reduced, rendered amputation necessary, the success of which was not disturbed by any untoward event; but, on the twenty-fourth day after the operation, when recovery was almost complete, Bonnet was suddenly taken with symptoms of tetanus, occasioned no doubt by the reflux of purulent matter, which still discharged from the wound. Perspiration was likewise suppressed in consequence of the imprudence of the patient in walking about at night. Diaphoretics and opiates were for several days given in large doses, without preventing the symptoms from increasing and rising to the highest degree. When, at last, some anodyne and antispasmodic emulsions, given through an aperture which had been left after the loss of two incisor teeth, had quieted the pains in the stomach of the patient, a large blister was applied over the entire surface of the stump, which re-established within twenty-four hours the suppurative process and induced a miliary eruption in the face and upon the breast. From that moment the patient grew considerably better; all the symptoms of tetanus diminished by degrees; the functions were restored, and on the fiftieth day after the operation, this soldier left the hospital perfectly cured.

Peter Grangie, a carabinier, received, at the siege of Cairo, a shot in his arm which required amputation on the spot. For the first few days, nothing interfered with the operations of nature; but, on the ninth, the patient, after an exposure to the chilly night air, was attacked with every symptom of tetanus. M. Lachôme, a surgeon of the second class, having perceived that the reflux of the purulent matter was the chief cause of it, immediately applied the blistering ointment to the wound, after the example of a prior success obtained by myself in a similar case. By this means the suppuration was at the end of twenty-four hours likewise reproduced; the cutaneous perspiration returned; the jaws relaxed; the danger disappeared, and by continuing the indicated remedies the patient finally recovered.

I wish that the above related cases may have a tendency to

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settle the opinions of army-surgeons, on the treatment of traumatic tetanus; that the unprecedented success of an operation may induce them to resort to it, and to abandon a practice where at every step death stares them in the face, for one where it is yet possible to save the lives of many valuable citizens.

## DISEASES AND INJURIES OF THE HEAD.

### *Mechanical Injuries of the Cranium and of the different parts of the Encephalon.*

WE shall forbear to go into the circumstantial details concerning these injuries; for they have been explained by every classical author. We intend only to recapitulate briefly the principal phenomena exhibited by them, according to the injury of the parts, the indications which they present, and the remedies to be employed for their cure.

It may be observed as a general rule that all wounds of the head which are made by side-arms, or by any other mechanical cause, capable of producing a clean and simple division of the integuments of this part, without injury to the bones of the cranium, ought to be closed, but in such a way as not to stretch their edges too much. A piece of fine perforated linen, spread with some balsamic substance, or dipped in warm sugared or honeyed wine, is for common cuts the best application to keep the parts in their place; if they should be very extensive or ragged, some adhesive strips are previously to be applied. There occur, nevertheless, some cases, where a few stitches are indicated; such as, for example, all wounds with large displaced flaps, made at the expense of the soft parts of the temporal or occipital regions. The stitches in such a case should be preceded by a counter-opening, to be made at the base of the flap, if that should happen to be at the inclined side, for the purpose of facilitating the discharge of the fluids, and of preventing their being lodged beneath the flap. The effects of the suture should afterwards be supported by a proper retaining bandage.

Contused wounds of the same parts are to be treated nearly in the same way; that is to say, after shaving the head previously, and extracting the foreign bodies, if any there are, they should be covered with a piece of perforated linen, wrung out in some of the above noticed lotions. It is not necessary to cut down to them, unless there be one or more culs-de-sac at some of their angles, or a laceration of the pericranium with contusion of the bones of the scull. The operation in such a case is to be done by careful and well directed incisions from the circumference to the centre of the solution of continuity. If there be any arteries divided, it will be indispensably necessary to apply a ligature to them, instead of employing mechanical pressure, which incommodes the patient and gives rise to cephalalgia; besides, the arteries which run under the hairy scalp, by dint of the close adhesions which retain them under that dermoid covering, do not retract with the promptness requisite to stop the further effusion of blood.

The edges of the wounds of the integuments separate but little from one another, because of the deficiency of muscles to assist in their retraction; which renders the enlargement of these wounds seldom necessary, and proves the efficaciousness of the most simple apparatus. A too early reunion, however, as we have mentioned already, should be but rarely resorted to; for it is not only useless, but may sometimes be productive of great mischief, the reason of which is easily assigned. Wounds of this nature are pretty commonly attended with more or less violent contusions; and as the original occurrence occasions the laceration of the capillary vessels of the hairy scalp and the destruction of the cellular bands which unite that covering to the bones of the cranium and to their external membrane, it is therefore an exceedingly rare circumstance when cicatrization takes place without some more or less copious suppuration. Now, if a pretty exact reunion were about being effected, the fluids would not have a sufficiently convenient place for discharging themselves; and being thus retained at every point of the wound, they would occasion an irritation and bring on inflammation and erysipelas. Having afterwards become more and more abundant, they finally succeed in making an internal

passage for themselves, between the skin and the bones, which they accomplish with the more despatch and facility, as the adhesive strips and the too closely uniting bandages prevent these fluids from flowing outwards, and as there usually exists a greater want of union betwixt the internal face of every part of the wound and the external surface of the bones. Now, if these fluids shall have once taken such a direction, their infiltration will go on in the same ratio, if the external obstruction which we have mentioned should continue to be in the way; therefore, in proportion to the quantity which may be accumulated there, and in proportion to the deleterious principles which they may have acquired, by their being confined there too long, they will originate denudations, fistulous passages, and collections of matter, or they will give rise to metastases; circumstances which in themselves would require not only the separation of the borders of the wound, but also counter-openings, all of which might have been avoided, but for those premature reunions which we do not hesitate to censure.

If, on the contrary, the solution of continuity be allowed to have a moderate degree of freedom, keeping it only in such a state of simple approximation, as we have pointed out, the disgorgement will take place without hinderance, and cicatrization will subsequently be accomplished almost of its own accord; but the removal of the first dressing should be delayed as long as possible, and never be attempted before the seventh or ninth day.

Wounds of the head with *simple* injury of the bones of the cranium, of the meninges, and of the brain itself, whatever may be the species of arms by which they have been produced, require, as to their dressing, the application of no other principles but those of which we have just now spoken; it is only with reference to the secondary symptoms to which they may give origin that a consecutive treatment will frequently become necessary.

With respect to such wounds as may be accompanied by simple or comminuted fractures of the bones of the cranium, or which are complicated by the presence of foreign bodies or other circumstances, besides the important local indications

which may offer, and of which we shall speak afterwards, they are entitled, with still greater force of argument, to a particular consecutive treatment. This above all must be throughout in conformity with the numerous and variable symptoms which are likely to supervene, according to the spot where the wound is situated, and according to the nature of the organs injured. All the resources of art require, under such circumstances, to be well known, and executed above all in proper season; a delay in the employment of certain remedies, may do irreparable mischief, by their becoming useless, and often prejudicial. And again, there can never be too much attention bestowed upon the examination of these solutions of continuity; never too much circumspection employed in the deduction of an opinion from them; for, whilst every thing appears to go on well and prosperously, alarming and truly mortal symptoms may break out all at once, even after a considerable lapse of time.

In a large majority of penetrating wounds of the head, the welfare of the patient will frequently depend upon the scrupulous attention with which every passing event is watched, upon the sagacity with which the symptoms which may present themselves, and which are often obscure, are distinguished, and upon the promptness of action with which they are anticipated and encountered. Still, experience has not only demonstrated that superficial lesions of the brain may be cured, but that such a happy result can be obtained rapidly and without obstacle.

*First Observation.*—At the insurrection of Madrid, in 1808, one of our soldiers received a sword-wound upon the right side of the head which divided a large portion of the integuments, the whole parietal protuberance, a part of the dura mater and a superficial layer of the cortical substance of the brain. I dressed the wound very soon after the occurrence. The bone being denuded of the pericranium, was removed, after which I formed out of the flap of the integuments a covering for the divided portion of the dura mater whose separated margins I had drawn together. We anticipated the symptoms of inflammation by blood-letting from the jugular vein, and from the arm, and by several cups to the base of the cranium and between the shoulders. This wound passed through all its stages without any

untoward event, and cicatrized in less than thirty days. We did not observe the slightest aberration in the intellectual and sensitive functions of this man whom we had an opportunity to see some time after this accident. The cicatrix was depressed, and rendered the pulsations of the brain still perceptible.

*Second Observation.*—Brocard Rivière, at the same time and upon the same occasion, had received a sabre-wound upon the left side of the head, extending from the parietal eminence to the fossa innominata of the ear, which divided the skin, the aponeurotic expansion of the temporalis muscle, a portion of the parietal bone as large as a five franc piece, the dura mater and a small slice of the substance of the brain. The flap had been replaced, without separating from it the fragment of bone which still adhered to the pericranium. The wounded had several paroxysms; the symptoms, however, gradually passed off, and towards the end of the second month he was restored to health, since which period we have had no further opportunity to see him.

During the campaigns on the Rhine and in Poland, we have seen two cases analogous to the above related, which terminated in the same way; still, results so remarkably successful are quite rare; most frequently it is altogether impossible to arrest the progress of inflammation of the meninges and the encephalon. Symptoms of effusion and compression are sometimes so rapidly developed that they allow no time to watch them; and the means of ascertaining the causes which produce them and the precise spot which these causes occupy beneath the bony covering of the cavity of the cranium, are moreover so slight and limited, that often nothing remains for us but uncertainty, inability, and of course but little hope to overcome them.

The consecutive phenomena, brought on by the more important and penetrating wounds of the head, vary, as we have said, according to the situation of the solution of continuity, and according to the nature of the parts of the brain which have been attacked either primarily, or secondarily. If the lesions or the changes of the brain are situated in the vicinity of some one of the points of its anterior or superior periphery, I have

observed in a great many instances that the loss of several senses and a diminished activity, or a sensible aberration of the mental functions more particularly predominates. So true is this assertion, that in all cases where the brain, in the places alluded to by us, labours under compression from some foreign body, the intellectual faculties are immediately restored in the same proportion in which art may have it in her power to remove the pressure, by liberating either the fluid or the mechanical obstruction which is the cause of it. The cerebral phenomena just spoken of are in like manner developed under the influence of other diseases, acting in an analogous manner. We shall again have occasion to enlarge upon them, when we treat of nostalgia, one of the affections which most commonly originate them.

If, however, the lesions or the alterations correspond to the base of the brain or its ventricles, there is no mental aberration; but various paralytic symptoms may be observed instead, which do not manifest themselves all at once. In fact, in all injuries of the head produced by mechanical causes, in an oblique direction from the base of the cranium towards its interior; in all metastases from a more or less remote point towards the same part; and finally, in all accumulations of fluids, occurring in the cerebral cavities, the alteration of the functions of the brain must present a different career, as they must be followed by different consequences. In all these cases, the compression made upon the origin of some one or all the nerves of locomotion, and of those of sensation, and of the mixed organs, must necessarily result in such symptoms, as the more or less decided loss of muscular motion and of the powers of sensation, as well as in serious derangements of the functions of the internal organs. If the brain has been injured or compressed in one of its hemispheres, the paralysis invariably manifests itself on the side opposite to the injury or compression, because, as every body knows, the fibres of that portion of the encephalon cross one another internally. This rule, so well established in this respect, admits of no exception; and if there are some cases to be found in authors which seemingly prove the contrary, that is to say, where the paralysis might have been observed on the

same side with the wound, it is in these cases certainly owing to a previously received injury which must have been the cause of the hemiplegia; but, as this paralytic symptom may not have been noticed before the occurrence of another injury on the side which corresponds with it, so may this circumstance have occasioned some neglect in searching after the original causes which in reality produced it. The mistake might have arisen also from the circumstance that the mechanical or spontaneously morbid cause did perhaps simultaneously spread to one of the lobes of the cerebellum, in the direction of the crura of the medulla oblongata, or of the posterior portion of that latter medullary production, where the nervous fibres of these deep-seated and posterior constituents of the encephalon do not pursue the same method of reciprocally crossing each other. Thus, for example, aided by the last mentioned reasons, and in consideration of the origin of the ninth pair of nerves, which, as we know, arise from the roots of the corpora olivaria, can the fact be accounted for, that, in some instances of hemiplegia, one half of the tongue which corresponds with the affected side, will, in preference, retain its power of motion? And, in like manner it happens, because of the same mode of arrangement, that in compressions and concussions which concentrate their force beside the cerebellum, the utmost difficulties are more especially noticed in the functions of respiration and deglutition.

An attentive examination, however, of the cases in opposition to these maxims, though reported by a great many writers, will, we trust, result in the discovery that they do not in the least degree overthrow the truth of the assertions which we have just now endeavoured to establish, with respect to the essential difference between the cause and seat of paralysis. Otherwise, if it might not engage us too long, it would be an extremely easy matter for us to prove, by the very details of these reported cases of hemiplegia, that the causes which produced them existed on the side of the brain opposite to that which had become affected with hemiplegia.

In order to make known, at once, the effects arising from an injury of those parts of the brain which seem to preside over the intellectual faculties, we propose to give an account of

several individuals who had been wounded in these very same parts, and in whom afterwards a more or less perceptible aberration of these faculties had been observed.

*First Observation.*—Joseph Duthain, aged 25 years, of a robust constitution, was received into the military hospital of Gros Caillou, in July 1821, on account of a sword wound which he had received on the middle part of the frontal, near its junction with the parietal bones. The weapon, which had been directed obliquely and with much force, had passed through a portion of the internal table of the bone, to the extent of about one inch in length. The inflammatory symptoms which had come on, were pretty promptly removed by means of repeated bleedings and by an antiphlogistic regimen. The only symptom which remained in force for a great part of the time that the wound lasted, and which was no doubt kept up by the existence of a slight compression of the surface of the anterior lobe, was a very evident incoherence of the ideas of the patient; his occasionally precise answers had most frequently no connexion whatever with the questions propounded to him. This mental aberration, however, yielded under the influence of the revulsives which I directed to be employed, in proportion as his recovery progressed, which was ultimately accomplished six weeks after his admission into the hospital.

*Second Observation.*—James Letort, a private of the second regiment of infantry of the guards, who had at different periods received similar wounds upon the superior regions of the head, appeared to us to exhibit a more decided intellectual derangement, when upon the occasion of a later sabre cut, received also upon the os frontis and combined with injury of the bone itself, he called upon us to require our services, in March 1822. There were, as in the preceding case, symptoms of inflammation, of cerebral compression and stupor, all of which we removed by bleeding, cupping, mustard pediluvia, and other antiphlogistic and revulsive remedies.

Although Letort left the hospital cured two months after his admission, his looks as well as his conversation still continued to betray some signs of a slight aberration. His comrades reported that this condition, together with a good deal of

caprice in his notions, must be constitutional with him, as for a long time they always had known him to be the same. It is evident that the numerous wounds which this soldier had received upon the head, had no doubt contributed to the situation in which he found himself.

We now intend to notice the effects of compression upon the different parts of the base of the brain.

*First Observation.*—A grenadier received, in Austria, a bullet on the left temple, on a level with the pinna of the ear. The projectile had, behind that part, made its way deeply into the temporal muscle, and was only arrested at the base of the mastoid apophysis of the same side. The presence of this extraneous body was not perceived at first, and the wound, trifling as it seemed to be, was simply dressed, and cicatrized in about a fortnight. But, at the very moment, when this soldier was about to leave the hospital, he was suddenly taken with vertigo, a sensation of heaviness and lancinating pains in the direction of the wound.

The next day, after a careful examination of the whole head, and perceiving, towards the base of the mastoid process, a small reddish tumour, pointed and fluctuating at the centre, I made an ample incision into it, when I discovered the bullet, it being incrusted deeply in the bony substance. Its extraction having been accomplished and the wound properly dressed, the patient was momentarily relieved. The symptoms, however, of a cerebral derangement returned, and went on increasing; a low nervous fever (*fièvre soporeuse*) made its appearance, and the patient, after having been struck with hemiplegia of the right side, expired in a comatose condition.

Upon opening the cranium, we discovered a fracture which passed from the mastoid process through the base of the petrous portion and extended as far as the sphenoid bone. The mastoid cells were in a carious condition; the corresponding lobe of the brain displayed a nucleus of suppuration, and some effusion of the same nature was found in the middle fossa of the base of the cranium.

*Second Observation.*—Nicholas Baumgartner, 23 years of age, a soldier of the 8th regiment of infantry of the guards, on

the 20th January 1821, whilst in the act of fencing with hazel sticks with one of his comrades (both being somewhat intoxicated), received so violent a thrust in his left orbit that he fell upon his back as dead, and a portion of the stick, which broke at the moment of the fall, was lodged in the orbit, where it must have penetrated deeply and even entered the cranium. This stick of wood, after having been pulled out immediately, was shown to us, and was indeed stained with blood for a space of upwards of two inches. A considerable hemorrhage from the nose and mouth almost instantaneously took place, after which the wounded was carried to the hospital. On his arrival there, the state of intoxication in which he still was, the unruly manner in which he conducted himself, and the vomitings which succeeded each other incessantly, did not permit us to attempt any thing. All that under these circumstances could be done were frictions with hot flannels, applied to the entire surface of the body, particularly to the extremities, which were as cold as ice.

The next morning the eye-lids having formed an ecchymosed tumour of the size of a large egg, I resolved upon separating them for the purpose of ascertaining the condition of the ball of the eye. This was accordingly done, after premising blood-letting from the temporal artery, and after dilating a wound which was situated at the angle of the eye-lids. The eye-ball had suffered no injury whatever, but the contusion it had sustained, was of so violent a nature as to paralyse the iris and occasion the loss of sight. The corresponding members also had lost their powers of motion. I endeavoured, with the aid of a sound, to trace the direction which the stick had taken, but could not reach it; upon examination, however, of the external angle of the eye-lids of the left side, that being the spot first struck by it, and considering that, indeed, it was the left side of the body which had been affected with hemiplegia, I suspected that the direction of this stick must have been very oblique, and that consequently it was the right hemisphere of the brain which must have been injured, or beneath which, at least, some effusion must have taken place. The autopsy of the body of this individual, as will be seen afterwards, fully

proved the correctness of my suspicion. This wound and this hemiplegia, both occurring as they did on the same side, are thus well calculated, I think, to furnish fresh proofs of the truth of the principles which we have advanced, respecting the primary source of muscular paralysis, and to show, besides, what variety of causes may sometimes be falsely believed to produce the effects of a change of structure, especially if the most minute and accurate attention be not bestowed upon all the facts before us.

But, let us return to our narrative. No mental alienation had manifested itself; the patient, on the contrary, complained in unequivocal terms of the torments caused by his extreme thirst, and answered quite clearly to the few questions which we addressed to him, either by words, or by signs, for he frequently found it difficult to articulate the sounds. The wound was dressed with a cerated linen rag, and a little scraped lint; the eye-lids were closed again with a head band, soaked in some discutient lotion. Sweetened demulcents, an anodine draught, clysters, and mustard foot baths were directed.

On the 22d the head of the patient inclined to the right side: but the hemiplegia remained stationary on the left, in addition to which an extreme difficulty of swallowing and symptoms of paralysis of the stomach supervened, owing no doubt to the compression of the pneumo-gastric nerve. I directed a scari-fying cupping-glass to be applied to the temporal region, and several more to the epigastrium and to the hypochondriac regions; two purgative enemata were administered in the course of the day, and in the evening a large blister was put upon the whole right side of the head.

On the 23d the situation of the patient became hopeless; the comatose somnolency, the coldness of the extremities, the pallor and changed expression of the countenance had now become too well marked to justify any other but a gloomy prognosis. Death, indeed, closed the scene twelve hours afterwards. The intellectual faculties had never been impaired; the patient, until he expired, having complained of thirst, of which we have spoken already. We have reason to believe that this symptom may have been induced by the considerable hemorrhage which

occurred at the moment when the stick was withdrawn, as also by the loss of blood which must have been effused into the cavity of the cranium.

This cavity presented upon examination a thin layer of blood, spread over the posterior surface of the brain; another and similar effusion, only more considerable, existed within the basilar fossæ of the cranium as far as the tentorium of the cerebellum. On searching carefully after the injuries which could have been occasioned by the stick, several lacerations of the cavernous sinuses and carotid artery were discovered, and a piece of bone belonging to the right posterior clinoid process which had been fractured, was picked up near the sella turcica; similar fractures were referred also to the os planum and ethmoid bone of the left side; and finally a small piece of wood several lines long was found sticking in the very substance of the middle lobe of the right hemisphere of the brain, near the fissure of Sylvius, which was the immediate cause of the existing paralysis.

*Third Observation.*—J.P. Lemière, aged 25 years, a private of the dragoon guards, was carried to the hospital of Gros Caillou, in the night of March 8th, 1822. This soldier had just received a lounge into the right orbit with the point of a trooper's sword (*épée romaine*). The direction of the weapon was from below upwards, and a little from within outwards, so that after having slightly and obliquely slit the point of the nose, it had passed through the integuments of the internal side of the inferior eye-lid, opposite to the nasal process of the maxillary bone; had somewhat grazed this process, and afterwards pursued its course between the floor of the orbit and the ball of the eye. (On raising the eye-lids, which being already swollen, had closed that organ, we could not, indeed, discover any alteration in its external appearance; a protrusion only of about half an inch beyond the eye-ball of the other side, seemed to indicate a division of the optic nerve which might probably have occurred at its extremity and passage through the sclerotic coat. The dilatation of the pupil, and the immobility of the iris which existed also, demonstrated the lesion of the nasal nerve.) Finally the weapon must have deeply

penetrated into the cranium, by entering no doubt through the foramen lacerum superius, and must have occasioned there a considerable effusion by dividing the blood vessels which it encountered on its route. There was, indeed, already a complete paralysis of the left side, and a pretty distinctly marked comatose somnolency. The surgeon in attendance contented himself with simply dressing the wound, and with the application of a mild cataplasma over the eye.

On the following day the hemiplegia had seized upon the left muscles of the face; there was some difficulty with respect to the mechanism of speaking, but not the slightest aberration of the intellectual faculties could be perceived. The patient but rarely and with difficulty replied to the questions directed to him, yet when he did so, he answered with the utmost correctness. I ordered his head to be shaved, and bled him myself from the temporal artery, in consequence of which he felt greatly relieved. I directed the dressing which had been made the evening before, to be reapplied, recommended venesection from the arm in the course of the day, and prescribed a ptisan of barley gruel, sweetened with honey and two glasses of an aromatized and sugared emulsion.

Two days later, and in spite of all the remedies which I employed, the symptoms of effusion and paralysis visibly and steadily increased. Since the occurrence of the accident the patient had had no evacuation, and as several common injections given to him had produced no effect, I ordered a draught with half an ounce of castor oil to be administered to him internally, and fomentations to be made to the abdomen with two drachms of resin of jalap, diluted in four ounces of olive oil. A large blister to the right side of the head was also applied on the same day. On the 16th there was a marked improvement, with less drowsiness, which afforded us another opportunity to convince ourselves again that the intellect of the patient had not sustained the slightest injury. Copious alvine evacuations, although involuntarily, had now taken place, which intimated to us that the sphincters participated in the paralysis; the muscles of the throat, likewise, could no longer fully perform their functions. With a view to excite the action of

the pneumo-gastric nerve, I directed one moxa to be applied to the epigastrium, and a fomentation with ammoniacum to be made to the abdomen. Frictions over the whole body with camphorated oil of chamomile, were also resorted to.

The next day one grain of potash was put to the base of the cranium, between the mastoid process and the inferior occipital protuberance. The patient did not the less relapse into his insensibility and somnolency; and as the pulse still exhibited some symptoms of irritation, I bled him from the foot. During that operation and for some time afterwards, the motions of the patient were observed to be more free, and he was again able very correctly to reply to the questions put to him. This second improvement unfortunately was not of long duration; his teeth and his tongue became fuliginous; the oppression and insensibility increased rapidly; and finally the patient expired in the middle of the night of the 23d, after uttering some plaintive screams.

The day following his body was opened. The wound of the nose was cicatrized, and that of the eye-lids was almost completely so. The scull-cap having been cautiously removed, an effusion of blood between the dura mater and the cranium presented itself. This effusion formed a pretty thick layer, and was nowhere perceptible but at the injured side and at its posterior part. At the last portion only of the right hemisphere, the brain appeared to us to be of greater volume, more dense and injected than in its normal state. In raising the anterior lobe of the right hemisphere, a portion of its cortical substance was found involved in a fracture which existed at the roof of the orbit, and extended as far as the base of the apophysis of Ingrassias. This fracture ran in a somewhat oblique direction. The weapon, however, had not at all injured this anterior lobe; it had only grazed it so as to bear entirely upon the middle lobe, which had been completely transfixed. Upon examining the internal surface of the roof of the cranium, there was, indeed, a puncture perceptible, with a fissure about three lines long by two in depth, at the middle of the right parietal bone, and about half an inch from the sagittal suture. Along the whole course of the weapon through the

parenchyma of the brain, that substance was softened and converted into small friable grains of the colour of wine-lees, whilst every where else its density by far exceeded that of its natural condition; the ventricle had not been opened at all; its interior as well as the spinal canal contained a little reddish serum. The peduncle of the optic nerve had not been so completely severed as we had suspected; this nerve had sustained only some injury lengthwise, and then only in its orbital portion. It is to be observed here, that the sight of the left eye had not experienced the slightest alteration.

The thoracic and abdominal cavities did not present any very remarkable signs of injury. Two pretty considerable intussusceptions were discovered in the intestinal tube.

This exceedingly curious case shows to what depth and extent the brain can be injured without the immediate destruction of the vital principle.

*Fourth Observation.*—During the campaign of Moscow, Barbin, a young grenadier of the ex-guards, received from the hands of a Cossack a thrust with a lance at the posterior part of the head, towards the centre of the lambdoidal suture. The iron of the lance had been so well tempered that it penetrated deeply into the left posterior lobe of the brain without producing a shattering of the bones. The wounded soldier was left for dead on the ground; but was taken up several hours afterwards and carried to the next town, where the wound was dressed and passed through its different stages, notwithstanding the obstacles which occurred. A cure was effected, but not without the loss of the majority of his senses, and he was troubled withal with very great difficulties in the exercise of the functions of several internal organs. His intellect had not become in the least deranged, and his limbs had merely exhibited a few slight signs of paralysis.

The effects of the wound appeared to us to have been concentrated altogether upon the nerves arising from the medulla oblongata, the glosso-pharyngeal, par vagum, hypoglossal, spinal and sub-occipital nerves. The voice, having been at first hoarse and faint, gradually became extinct; the hearing, taste, and smell grew weaker, and the external and internal muscles of

the larynx having in part also become paralysed, the latter organ fell about half an inch below its natural position. It is evident from this unnatural falling down that the borders of the glottis are retracted, and that the epiglottis is bent over that opening, in consequence of the disturbance which the aryteno-epiglottidei muscles had undergone; therefore, in order to breathe in the standing position, the individual is obliged to close his jaws firmly and continually, so as to raise the larynx upwards by means of a simultaneous contraction of the elevator muscles of both the pharynx and the maxillæ, after the fashion of frogs to inhale the air necessary for their respiration.

"In the case of Barbin, the diaphragm, participating in the paralysis, can no longer act upon the lungs. The frogs, which are without that muscular partition, supply its place, by closing their jaws, as has been observed by Heroldt;\* and it is probable, according to some experiments made upon this man before the Philomathic Society, that if his jaws had been kept separated for a few seconds longer, he would have been suffocated, as the frogs perish when they are made to undergo similar experiments which are prolonged for several moments.

The pharynx, œsophagus and stomach had lost their functions likewise, for deglutition is performed with difficulty, and from that time this grenadier could not in the slightest degree be excited to vomit. The abdomen scarcely at all presents the alternate and synchronous respiratory heavings which may be observed in every individual; and when he is subjected to the most trifling experiments, his face becomes discoloured, his body is bedewed with perspiration, the cold to which his extremities are habitually subject, increases; the motions of the heart are very slow and hardly perceptible, and the pulse is nearly gone. In the reclining posture, however, Barbin respires better and is much more at ease.

When, at a later period, I presented this soldier to the medical society of the school, and to the Philomathic Society, the situation of the wound displayed a cicatrix of about one inch in depth by one and a half in length, and the phenomena which

\* *Nouveau Dictionnaire d'Histoire Naturelle, tome x, art. Grenouille.*

I have described, still continued to be the same. His intellect, on the contrary, performed its functions with remarkable precision, for he replied in writing and with correctness to all the questions put to him.

These last cases which have just been read, moreover, afford in my opinion a pretty evident proof that the organs of induction reside, as Doctor Gall maintains, within the periphery of the anterior and superior half of the brain. For as the considerable effusions which, at the instance of these different wounds, necessarily occurred in the interior of the cranium, could not rise to the degree of elevation of the hemispheres above alluded to, so this portion of the encephalon remained sound, until the nerves which arise at the base of the brain, and which, on the contrary, had been injured and compressed, promptly lost their power of conducting the vital stimulus, and allowed the organs to sink into a paralytic state.

When the pathological effects bear upon some one of the points which serve as demarcations to the roof and base of the cranium, and when they, without concentrating themselves any where in particular, are uniformly communicated to the neighbouring parts, the symptoms which more especially belong to either the one or the other, may be seen to arise simultaneously or alternately, and to disperse again of their own accord. The following case is a striking proof of it.

Anthony Moignot, aged 25 years, a soldier belonging to the train of artillery of the guards, had, on May 1st, 1822, a violent fall from his horse. The posterior part of the head sustained almost entirely the weight of the shock. The blood flowing profusely from his nose and left ear, he was taken up in a state of insensibility, and forthwith carried into the hospital. Several scarified cups which the surgeon on duty applied to the temporal and occipital regions, to the nucha and between the shoulders, roused the patient for a moment from the comatose state into which he had sunk; but he soon relapsed, and thus passed the remainder of the night.

The next morning I thought it absolutely necessary to open the jugular vein, a few moments after which several of his senses returned, although in an imperfect manner. His speech

was difficult; the ideas of the patient were vague and incoherent; and a satisfactory answer could be but rarely obtained from him. I now examined the head attentively, and as its left lateral portion presented a considerably ecchymosed surface, I made a deep incision and put a cupping-glass upon it. No very perceptible sign of a fracture could be discovered.

*May 3d.*—The patient still continued to be very insensible; when roused and pressed with questions, he replied with difficulty, and, as it were, in sleep. A depletion from the temporal artery gave him once more decided relief; but towards night these effects disappeared, and in addition a slight febrile delirium supervened. Diluted and mucilaginous drinks were prescribed with mustard baths for the feet, and ice to be placed upon the head.

The next day there was a sensible improvement, but some difficulty in the motions of his arms had now made its appearance. (Scarified cupping-glasses to the superior region of the back, and a blister to the posterior and inferior region of the head, were applied for it.) These remedies and a caustic issue which I directed to be made at the base of the cranium, between the left mastoid process and the inferior occipital protuberance, imperceptibly dispersed the above symptoms. The stupor having diminished, the patient became more cheerful and his muscular motions more free; finally, he was discharged perfectly cured on the 12th June following.

Varieties of the cerebral phenomena, after mechanical or morbid lesions of the encephalic substance even more singular than those of which we have just now spoken, might be submitted for our consideration. These changes, when they exist in the cerebellum, either primarily or secondarily, are capable of attacking the organs or the functions of generation. (We shall return to this part of our theory in a particular memoir upon the injuries and other affections of the cerebellum.)

A lesion or a concussion of certain parts of the brain, the precise situation of which cannot be well pointed out, but which, according to our observations, has appeared to us alone to correspond more especially with some of the lateral and a little anterior regions of the lobes of this organ, is mostly attended

by the loss of some of the powers of memory; that is to say, individuals who have become subject to these alterations, cannot very well remember names and objects which they do not habitually make use of, such as the proper names of individuals, or of certain objects, and particularly very complicated names.

We shall not venture to explain a peculiarity so astonishing; but there are the facts and it is impossible to contradict them. We shall proceed to report in full detail the instances in which these last mentioned phenomena have more particularly presented themselves for our investigation.

*First Observation.*—During the terrible day of Esslingen, a young man, 21 years old, was struck by a ball on the left temple, near the orbit. This wound which, when I saw it, had the appearance only of a fistulous injury, gave rise to some very remarkable phenomena. The left eye protruded considerably outwards, and its optic functions were entirely annihilated; the left side of the cranium was sensibly more elevated and more developed than the right, and presented there, towards the temporal region, perceptible to the eye as well as to the touch, a space a finger's breadth wide, which extended as far as the sagittal suture, and resulted evidently from a deficiency of union between the frontal and parietal bones.

Numerous instances occur in surgical writings of the separation of the bones or sutures of the cranium, which almost always terminated fatally before the ninth day after the accident; but I know of none so serious as the one I am now relating, and the consequences of which the patient nevertheless survived. He was, moreover, deprived of the use of his senses, and of nearly all the faculties of the life of relation; the internal organs alone performed their functions with some degree of regularity.

All these circumstances induced me carefully to examine the situation of the injury. I probed the wound and thought I could discover the ball deeply seated against the orbit. It was, in fact, extracted after making a moderate incision; it was irregularly flattened and movable, although it had been originally wedged in the substance of the bone. The excavation made by its extraction allowed the pulsations of the brain

distinctly to be felt. After this operation, which was performed in August, the condition of the patient appeared to improve; he formed a new language for himself, after the manner of infants who have just began to prattle. He expressed, for example, the affirmatives by the word *baba*, the negatives by that of *lala*; and when he wanted any thing, he loudly uttered the words *dada* or *tata*. At the commencement of December, however, he was attacked with the hospital fever, which almost suddenly carried him off.

Having been obliged to return to France, the French surgeon whom I had entrusted with the management of the hospital, a month later, had the extreme politeness (as I had requested him to do in case of this soldier's death), to send to me his head in a small cask filled with a solution of oxymuriate of mercury.

The dissection of this head, which I made with the utmost care, displays the great resources which nature, even in the most hopeless cases, is capable of developing. The dura mater adhered closely to the sutures; and it had acquired a considerable degree of thickness and consistence precisely over the whole extent of the separation of which I have spoken; the convolutions of the brain corresponding with the fracture were effaced, and the membranes which covered this portion of the cerebrum were likewise much thickened and adhered to one another. There was an aperture at that part of the frontal bone which is situated below the temporal process and behind the external angular apophysis; the margin of that aperture, which was only six or seven lines in diameter, was smooth and round. Externally, a bony cicatrix, originally the ray of a fracture, was observed to depart from it, which extended about an inch towards the frontal protuberance of the same side. An attempt even at ossification and cicatrization was noticed to have been set up in the serrated edges of the separated parietal and frontal bones, as also at the injured parts of the orbital region of the latter; a lamina of bone which had been fractured and depressed by the ball from the side of the orbit, and thus caused the compression of the eye-ball (whereby it had been displaced and deprived of its optic faculties), had been reunited to the frontal bone by means of a membranous substance which in several

places was already ossified. Finally, the cranium, now in the collections of the faculty, presents also a considerable increase of volume in its whole left lateral extent, and a very perceptible reduction of the transverse diameter of the orbit of the affected side.

When I reflect on the mechanism of the extraordinary separation of the bones which occurred in this individual, I cannot account for it in any other way than by supposing that the ball, after striking, at the termination of its rectilinear course, the points of union of the frontal, parietal and sphenoid bones, must have penetrated between them, by breaking and depressing against the orbit the most fragile of the three portions, and by separating at the same moment the two others: again, in proportion to the resistance of the ball which subsequently acted between them like a wedge, must the effected separation have been augmented and preserved until the rather remote period, when it was dislodged and finally extracted.

If by well directed and cautious exertions the ball could have been extracted in the beginning, a great deal of the organic efforts which were set up for its ejection, might doubtless have been saved; but, on the other hand, would there not have been cause to apprehend that by these very attempts the foreign body with the bony fragments might have sunk deeper into the cranium and wounded the brain, or that the patient might have been exposed to an alarming hemorrhage from the deep-seated temporal or meningeal arteries? I believe, therefore, that the wisest plan was that which had been pursued. Besides, it is very evident that in this instance nature was fully disposed to accomplish his recovery, which undoubtedly would have taken place, but for the contagious disease by which he had been attacked.

*Second Observation.*—M. Edward Derampan, an ex-officer of cavalry, whilst in the exercise of fencing, on the 2d March 1817, received a thrust with a foil (the point of which had been broken off on the breast-piece) in the left canine region, near the ala nasi, in an oblique direction from below upwards, and a little from without inwards. The instrument, to the extent of three and a half inches, penetrated into the left nasal fossa,

passed through the cribriform plate of the ethmoid bone, and doubtless entered from eight to nine lines into the internal and posterior part of the left anterior lobe of the brain, so as to approach the anterior portion of the corpus callosum.

A profuse hemorrhage was the immediate consequence of this occurrence, and a proportionate quantity of blood may probably have been effused in the interior of the cranium, for M. Derampan a moment afterwards fainted and entirely lost the use of his senses which he only recovered gradually and imperfectly. The faculty of sight was after a few days restored to the right eye; the left was deprived of it for upwards of a month. The sense of smelling, which had been completely destroyed, after a certain period became again developed in the right nostril, and the patient very plainly distinguished, on that side, the sweet-scented alcoholic liquids from those which were not scented; however, the susceptibility for odours continued to be less acute than that of the left side. The sense of taste was equally affected, but in such a manner that the right half of the tongue was perfectly sensible to sapid impressions, whilst the left side was deprived of that faculty: this organ inclined, besides, to the right, owing to its resistance to the hemiplegia with which the right side had been attacked; the commissure of the lips was drawn to the left. The sense of hearing, being at first destroyed in the ear of the affected side, was subsequently restored. The whole right side which had been struck with paralysis, insensibly resumed the largest share of its motions.

The recollection of the substantive nouns which are analogous with the proper nouns, was totally lost, whilst the remembrance of material objects and of all that is susceptible of description, preserved its utmost integrity. Thus, for example, the patient perfectly well remembered the person and features of M. Larrey, from whom he had, at different times, received some attention for various complaints and injuries; he knew him well, he saw him constantly before his eyes, (as he used to express himself); but he never could remember his name, any more than that he designated him by that of *M. Chose* (Mr Something). In like manner had he forgotten the names of his kindred and friends. He could not in the least recol-

lect the names of the divers pieces of which the lock of a musket is composed, and yet he could give an excellent description of it. The mental alienation with which this officer had been afflicted at first, had ceased; but every thing that in any manner related to his self-love, or to his military success, threw him again into a state of derangement and deep melancholy, while the conversations which had any reference to his family, to his parents or friends, allowed him the free use of his intellectual faculties.

*Third Observation.*—Lewis Manez, 24 years old, a brigadier of dragoons, presented himself, towards the end of the year 1815, at the hospital of Gros-Caillou, on account of a ball which had struck him on the external side of the forehead, about four or five lines from the left eye-brow, at the point which corresponds with the curved line of the temporal region. This ball, which had wounded him at the battle of Waterloo, on the 18th of June of the same year, at least one half of its sphere having penetrated into the cavity of the cranium, had become imbedded in the substance of the os frontis, whilst the other half was found closely united to the external surface of the bone, but in such a manner that by any of the ordinary means it was impossible to dislodge the extraneous body from its bony roadstead; the patient having declined the application of the trephine, the only remaining means by which it would have been practicable to make a passage for this projectile, of an extent sufficient for its extraction. The foreign body afterwards remained stationary in the same place and relation up to May 28th, 1824, at which period I had occasion to see this soldier again, then a sergeant in the sixth regiment of the royal guards; from this I must except, however, some external portion of the ball, which by the attempts made in 1815 had been detached. There remained at that time and place only a small fistulous sore, which this subaltern kept open by means of bougies made of small pieces of scraped lint, by which particular and daily attention he had been enabled to remain in service and to continue to do his duty with all possible exactness.

The shot having been received from a pretty considerable dis-

tance, was in the first instance marked by the fall of the wounded man, by a profound and long continued syncope, with loss of consciousness and the use of all his senses, and by the spontaneous and involuntary discharge of his urine and excrements. After these first symptoms, a considerable hemorrhage took place from the wound, to which he owed, no doubt, his return to life. Notwithstanding these circumstances, he, with many more wounded French soldiers, remained on the field of battle without relief for two days and two nights. It was not till towards the end of the second day that he was picked out and lifted up by an inhabitant of Brussels and carried by him into his own dwelling-house, where this generous citizen lavished upon him all the assistance which his condition required. The surgeon who had been desired to take charge of him, dilated the wound and made some fruitless efforts to extract the foreign substance; by means of repeated bleedings, diluent and cooling drinks, and by an appropriate regimen, he succeeded, however, in dispersing the existing symptoms of compression, which was characterized by paralysis of the extremities of the right side, by a sense of weight and a very great restraint in the performance of all the functions, as well as by those symptoms which indicated already an inflammatory action in the whole head. After this treatment had been continued for several months, the patient being in a fit condition to travel, was given up to the hospitals of Paris, where he afterwards was admitted into my wards.

The functions of locomotion were enfeebled and the whole periphery of the wound was still inflamed. We discovered very plainly that the ball (of the caliber of the English musket balls, which are by a tenth part heavier than ours) was in reality imbedded into the substance of the os frontis, in such a manner as to penetrate by one half, at least, of its thickness into the cavity of the cranium, as we have already noticed. Under such circumstances we were convinced that this portion of the lead had depressed the corresponding part of the dura mater and the subjacent convolution of the brain which forms a projection upon the lateral and external part of the anterior lobe; from which depression the serious symptoms above mentioned originally resulted, but which were, nevertheless, gradually

dispersed to such a degree that he not only recovered the use of all his faculties, but entered once more upon the active military duties of the infantry service.

The only injury which since then the intellectual faculties had sustained, consisted in the loss of recollection of the substantive nouns; and nobody knew better how to analyse and appreciate the failure of that particular faculty than this young soldier, because of his being the subaltern instructor of his company. Thus it happened in the exercises of the musket, that, after having explained all the manœuvres of which they consist, and after having given a description of the pieces which enter into the lock of his weapon, he was obliged to consult his pocket-book to find and designate the name of each of these pieces. The same circumstance equally obtained with respect to the soldiers of his company, whom he distinguished very well by their stature, shape, complexion, or by the sound of their voice, but whose proper names he remembered with difficulty, and whom, in this respect, he often confounded one with another.

The failure, or rather the impaired condition of the functions of this faculty had increased from day to day, according to the statement of this soldier, while the other faculties appeared to have become more perfect; yet the contrary happened at the moment of the accident and for some time afterwards, when all his functions were disturbed, and when he could only with difficulty discern the most simple objects. For a considerable time he was at that period also deprived of sight and hearing on the wounded side, and a good deal restrained in the functions of locomotion of the two opposite extremities.

This individual having always opposed the application of the crown of the trephine to the most favourable point of the periphery of the foreign substance, for the purpose, after having opened a free passage, of dislodging it with an elevator from within outwards, we did not deem it advisable to exert too much force upon the external surface of the ball, from the fear of separating it from the internal portion which might then have sunk deeper into the substance of the brain, and we preferred therefore to leave the process of expulsion to the sole resources of nature, the more so as it was not con-

nected with any symptom which imperatively required its forcible extraction. In this young man as well as in the Russian soldier from whose forehead we extracted a biscayan, as will be seen below, the osseous and still elastic fibres were not ruptured till long after their having yielded to the action of the projectile. Growing again immediately afterwards upon themselves, it was, in the case before us, still more impossible to extract this foreign body, as it had divided their substance in such a manner as firmly to embrace the portion of the perforated bone. Believing, thus, that it would be prudent to wait until nature should have pointed out some new indication, we deemed it expedient to return this non-commissioned officer to his regiment.

Ever since his last discharge from the hospital, to November 10th, 1827, I had heard nothing more of this soldier; but at the latter period I was informed by my colleague, Doctor Cornac, physician to the hospital, that a non-commissioned officer, then died in his wards of phthisis pulmonalis, and that, if I wished to be present at the examination of his body, he would direct to have it done the next day.

At first I had some difficulty in recognising the head of my young sergeant; I had to inspect and touch the ball over and over again before I could be convinced. His physiognomy was completely changed, and his hair had grown as white as those of a man of seventy years of age. Being obliged to respect the corpse of this individual, as he was to be interred with some distinction, I could not preserve his head entirely, so I merely separated the scull-cap from it, taking care to apply the saw below the place of injury. This section being accomplished, we found:

1. The dura mater closely adhering to the entire internal surface of the cranium, and especially so on the side of the wound; this membrane was also much thicker and denser than in the natural state.

2. A circular excavation of about one inch and a half in diameter, by four or five lines in depth, at the summit and somewhat on the temporal side of the left anterior lobe of the brain. This excavation was lined with a fine reddish membrane which

appeared to us like the continuation of the first. The subjacent portion or layer of the brain was healthy as well as the remainder of the encephalon.

3. The pedicle of the ball, at the base of which the vestiges of the unsuccessful efforts for its extraction were still perceptible, reached by several lines beyond the level of the periphery of the cranium, and the circumference of the opening which had given it access, had been worn slanting from without inwards, in consequence of a process of worm like decay (*travail de vermoulure*), which nature seemed to have set on foot in order to facilitate the extraction of this foreign substance.

4. In the cavity of the cranium and at the spot corresponding with the wound, we found a round eminence of about one inch in breadth and from four to five lines projection, which had been formed by the union of three or four bony fragments joined together by a soldering process, as was indicated by as many lines or cicatrices. It is very evident that this bony eminence was the result of the fracture of the frontal bone, whose internal table had been split in pieces; the force of the projectile having been broken by this resistance, it remained enclosed within the substance of the bone and tightly bound by the elastic action of the osseous fibres.

It seems to me pretty difficult to explain the causes of the singular phenomena which in the case of this soldier presented themselves during the various stages of the wound. We shall attempt, however, to illustrate the operation of these causes.

1. The symptoms which supervened immediately after the accident, prove that a portion of the parenchymatous substance of the brain had become instantaneously compressed under the action of the bony fragments separated from the cranium by the shock of the projectile; hence the prostration of the individual, the loss of consciousness, which was successively followed by that of all the functions of the life of relation, but chiefly of the muscular action of the two extremities of the side opposite to the wound; this compression had been necessarily augmented by the effusion of blood, which must have been considerable, for although the hole made by the bullet into the *os frontis*, had been closed, there occurred neverthe-

less, shortly after the accident, a very profuse hemorrhage from the wound, which no doubt contributed to the safety of the patient. This hemorrhage could only have been caused by one of the meningeal arteries which run between the dura mater and the cranium. Indeed, on one of the bony fragments there is still to be seen a very large furrow, made by the artery, which at the moment of the fracture had probably been ruptured. Nevertheless, after a succession of fits, the symptoms of compression subsided; the effused fluids were gradually absorbed, the inflammation dispersed, the lacerated or depressed portion of the brain cicatrized and continued to be borne down by being in permanent contact with the splinters soldered together, which constituted the eminence of which we have before spoken.

We found the frontal, sagittal and lambdoidal sutures completely obliterated, which perhaps will account for the premature old age of the individual, as it was evinced by the whiteness of his hair and the wrinkles of his face. We shall under another head have occasion again to speak of this latter phenomenon (the premature ossification of the sutures of the cranium).

Finally, in the case of Manez, nature had gradually, and little by little, accustomed herself to the presence in the cranium of this foreign substance, which after his recovery was not attended by any other infirmity than that of being deprived of that portion of memory which is destined to assist us in recollecting names of persons and objects not always before our eyes. This kind of aberration he retained for ever.

2. The soldering process of the broken fragments had only taken place because they had not been isolated entirely from the adhesions of the dura mater, and because the fracture which separated them had not been so complete as to interrupt thereby the circulation of the blood-vessels of the bones.

3. In consideration of this soldering, it would have been imprudent, after the first weeks, obstinately to insist upon effecting the discharge of the ball, after having previously enlarged, however, the opening by the application of the trephine, because these splinters were soldered together and connected with the internal circumference of the aperture of the cranium.

4. It cannot be ascertained to what extent this gun-shot wound may have sympathetically attacked the integrity of the functions of the internal organs, the deep-seated injury of which caused the destruction of the patient.

Upon the whole, this fact, whilst it justifies the necessity of the trephine in the first moments, proves nevertheless the great resources which nature has in store even in the most desperate cases.

*Fourth Observation.*—The subject of this case is an individual in whom, under the separate consideration of the cerebral organs and of the characteristic features of their respective injuries, the most extraordinary anomalies and the most curious phenomena have been exhibited.

Lecœur, a fusilier in the second regiment of infantry of the royal guards, twenty-two years old, of a robust habit of body and most cheerful disposition, whilst fencing with one of his comrades, on November 19th, 1820, was struck violently in the right eye by a foil, the button of which had been broken off in the meshes of his mask. The point of what remained of the blade of this species of arms transfixed the superior eyelid, below the eye-brow, and on the internal side of the orbit, and penetrated deeply into the cranium in an oblique direction from right to left and from before backwards. Besides the right optic nerve and the anterior lobe of the left hemisphere of the brain which appeared to me to have been injured, the weapon must have ruptured several blood-vessels on its passage, and immediately have caused an effusion in the vicinity of the fissure of Sylvius, in the anterior fossa of the cranium, and perhaps even still farther. The wounded soldier did not fall after this accident, nor did he even lose his senses; but he was suddenly taken with acute pain in the head, especially of the side of the forehead opposite to the wound, and with a painful numbness along the whole right side of the body, accompanied by some slight convulsive action of the face. This soldier, who did not appear to have lost his reason for a single instant, caused himself to be conducted to the barracks, and was not brought to the hospital of the guards until the next morning.

The paralysis had already extended over the whole right

side of his body; the pectoral extremity, in particular, was totally deprived of every kind of motion, whilst animal sensibility was kept alive, and subsequently even increased. The tip of the tongue protruded from the mouth and inclined to the right in an inverse ratio to the hemiplegia, which circumstance induced me to think that the effusion had extended to the most oblique points of the cavity of the cranium. The pulse, full and slow, gave not more than forty-five or six pulsations per minute; respiration and deglutition were difficult, and the patient could hardly articulate. My first care was to dilate the small wound of the eye-lid, it being then surrounded by ecchymosis and swelling, which had spread over the whole orbitar region. A probe being next cautiously introduced to the bottom of the wound; I discovered a perforation which seemed to me to go towards the ethmoidal fossa; but in conformity with my rules I dared not venture to penetrate through this aperture; it was sufficient for me to know that it communicated with the cranium in order to form my prognosis and direct my mode of treatment accordingly.

After this small operation I bled him profusely from the right temporal artery, and ordered several scarifying cups to be applied to the nape of the neck, between the shoulders and over the hypochondria; the feet and legs were covered with cataplasms of mustard flour, besprinkled with strong camphorated vinegar; and a bladder filled with ice was constantly kept on the head. The patient was put upon the use of cooling and mucilaginous drinks; besides which several purgative enemata were administered. In the evening he was bled from the arm. The following night he was much disturbed; the patient complaining continually of acute and steady pains in the head, chiefly on the left side of the forehead; the wound caused him no uneasiness whatever. Upon the least motion, he was seized with vertigo and disposition to faint. In addition to these symptoms, obstinate constipation and retention of urine supervened which compelled me to have recourse to the gum-elastic catheter.

*November 23d.*—The cephalgia and symptoms of compression of the brain having increased, I depleted him largely

from the jugular vein; cups to the nape of the neck and between the shoulders were repeated, and the application of ice to the head and of mustard cataplasms to the legs was continued. I persevered also with the mucilaginous diluents, and prescribed, besides, an antispasmodic draught, with the addition of a pretty strong dose of acetate of ammonia, so highly spoken of latterly in cerebral affections. The retention of urine ceased and copious alvine evacuations were obtained. Two days later I directed the application of cups to be renewed once more, and the superior and left lateral surface of the head to be covered with a blister. The pains, drowsiness and vertigo dispersed. At length, by means of the revulsives, which I continued to employ until the nineteenth day, all the functions were imperceptibly restored. The hemiplegia alone was obstinate; the intellectual faculties had never been impaired. For, although labouring under the impaired mechanism of speech, the patient replied, however, with considerable precision, to the questions put to him, and frequently answered for the assistants, whose conversation he used to follow. Notwithstanding, however, the accurate combination of his ideas, which constantly enabled him to play at cards with his comrades, and to play even with success, Lecœur had totally lost the faculty of recollecting proper names. In fact he could not tell me the name of either of his parents, or any of his friends—nay! he had even forgotten his own.

A remarkable peculiarity presented itself, likewise, in the optic functions of the right eye. The patient, whenever he kept his head still, would see with that eye only the horizontal half of any objects before him, or in other words, in the axis of the pupil which admitted their optic cone. Whenever they digressed from this axis inwards, and beside the nose, they became by degrees fully perceptible; if, on the contrary, they removed outwards nearer to the temple, the head of the patient remaining always unmoved, these objects would disappear in the same way, although a part of the cone of the rays which transmitted their form, penetrated still through the pupil to the fundus of the eye; for this cavity, as well as the membrane by which it is formed, had not sustained the slightest

alteration, and its motions were performed with the same precision as those of the left eye.

This singular phenomenon, on account of which I particularly introduced him to the Medical Society of the Faculty, seems to prove: 1. That the retina is an expansion of the optic nerve, because the weapon had not injured any part of the eye, the root of that nerve excepted, as we shall learn afterwards. 2. That organs of different kinds have not merely distinct properties, but that those very organs may experience partial alterations in their functions. 3. That the filaments which, in connexion with the encephalon, compose the nervous trunks, have a distinct origin, and receive from that organ a particular stimulus in proportion to the functions over which these elementary filaments preside.

Notwithstanding the sensibly ameliorated condition which our soldier had attained, he was distressed to see himself deprived of the use of his arm and leg. However, he had soon again cause to be rejoiced, for, upon the first application of the moxa to the anterior cervical pair of nerves of the paralytic side, he felt in both extremities very powerful contractile motions, which, under the influence of this caustic, I caused to reappear at will. This phenomenon greatly surprised the assistants, and made the patient shed tears of joy and affection. The functions of the muscles of the face were likewise gradually restored by means of several moxas applied behind the right ear and over the passage of the principal branches of the facial nerve.

The patient walked very well; he began to promenade in the yards of the hospital and even in the streets; for two months and a half after his misfortune he repaired on foot to the Medical Society. His internal functions also had recovered perfectly, when he was almost suddenly taken with diabetes. His urine, on being analysed by Dr Duponchel, apothecary to the hospital, precipitated a pretty large quantity of saccharine principle. I believe that his new affection had been in a great measure occasioned by the *Spiritus Mindereri* which, in doses of several drachms, I had given him for a considerable time, in pursuance of the opinion of the physicians who recommended it in such large

doses: now, as there scarcely exists a more powerful diuretic, it is no longer doubtful that this substance had too highly irritated the secreting urinary organs and the mucous membranes of the digestive viscera. This circumstance justifies the maxim of the older physicians, who recommended the exhibition of this remedy only in small doses of one scruple at most; and it proves besides, as I have had occasion to notice in other instances, that the proximate cause of diabetes consists in some kind of phlegmasia of the kidneys and of those viscera which maintain a sympathetic connexion with the former. I immediately prescribed cooling and iced mucilages, dry alkaline frictions over the whole surface of the body, and scarified cups to be applied to the lumbar regions; and I should afterwards have made use of the moxa, if the disease had not yielded to these remedies. In fact, from the seventh day all the symptoms disappeared, and the patient was once more in a satisfactory condition. Of the paralytic affection which had existed before, the upper arm alone remained yet under its influence and imperfectly performed its office.

Meanwhile, Lecœur waited with impatience for the furlough of convalescence which I had promised him, in order to go home, which he anxiously desired to do, when, on February 18th, a letter from his brother informed him that a woman with whom he used to live in familiar intercourse, had kept a considerable sum of money, which he had sent him to defray his travelling expenses. This piece of news made such a deep impression upon him, that at the end of the meal which he had then just finished, he was attacked with great indigestion, headach, colic, repeated vomiting, and soon after suddenly with stupor and universal numbness. His lower limbs were ice cold, which the application of artificial heat failed to obviate. On my visit of the 19th I instantly ordered the whole posterior surface of the cranium to be covered with a large blister, sprinkled with equal parts of cantharides and camphor; I prescribed mild injections, some antispasmodic remedies, and burning hot flannels to be applied over the entire surface of the body. The disease, however, increased rapidly, and all the organs of sense and of locomotion became paralysed. The pa-

tient made his urine involuntarily, and it may be stated that, after the 20th, the whole life of relation had become extinct; the functions of the internal organs, though very languid, were preserved till the night of the 21st to 22d, when this interesting man expired, which was the third full month after the occurrence of the accident.

*Post mortem examination.*—I commenced with opening the cranium, where I found all the vessels of the dura mater engorged with black and fluid blood; this membrane being raised, I perceived on the superior surface of the brain, a thin layer of albumen, blended with the arachnoid; on the internal surface of the nasal protuberance (*bosse mammillaire*) of the os frontis and very near the ethmoidal groove, I noticed a transverse aperture, about three lines long, and one in diameter, together with a separation of a lamina of the internal table of the bone, on which I found a thin layer of cortical substance of the brain adhering to the circumference of this aperture; the corresponding region of the encephalon displayed a concavity analogous to the detached cortical portion. From this concavity there proceeded a canal superficially along the internal margin of the summit of the right hemisphere, as far as the level of the concave margin of the point of the falx, by passing over the olfactory nerve of the same side; it crossed the space of separation of the two hemispheres and penetrated two lines deep into the substance of the left, by passing along the left optic nerve and the root of that of the right side. This root had been injured by the point of the instrument near its origin and beneath the anterior cerebral artery, which had been abraded there, and much dilated; finally, the extreme end of the foil had been arrested at the inferior wall of the lateral ventricle, very near the left branch of the medulla oblongata. This oblique canal, which might have been from two and a half to three inches long, was lined with a layer of bloody coagulum; there was not the least vestige of suppuration. We found only a little serum of a rosy complexion underneath the two lobes of the left hemisphere of the brain, which extended far under the cerebellum and into the vertebral canal.

The thoracic organs, as well as the glandular viscera of the

abdomen, the liver, kidneys, and pancreas presented nothing remarkable. The stomach exhibited no disease whatever; the jejunum had become inverted in three different places to the extent of two, three and four inches. These intus-susceptions were recent and without inflammatory appearance. Nevertheless, the ileum was found inflamed throughout all its tissues; the large intestines were everywhere filled with hardened and convoluted faeces.

This autopsic examination fully justifies the prognosis which I had established respecting the nature and extent of the injury of the brain. It shows, besides, that lesions of this organ, which hitherto were always looked upon as mortal, are susceptible of being cured. That of Lecœur might in reality be considered so, for the serum effused beneath the left hemisphere and cerebellum, had doubtless not been accumulated there, until all the vital powers of the patient had become exhausted. This much is certain, that the blood which had occupied that spot in the beginning, had been completely absorbed, which is proved by the walk which he took from the hospital of Gros Caillou to the School of Medicine and back, without having experienced the least deviation of his intellectual faculties. In fine, it is incontestable that the cause of his death must be referred to the superficial changes of structure of the brain, excited by the moral nostalgic affection to which he was predisposed no doubt, in consequence of the effects of the injury and the intus-susception of the intestines. The latter disorder might have had another cause also in the immoderate use of ardent spirits which the patient clandestinely procured. Yet, could it not have been brought on by the paralysis which, during the latter stage, had affected the superior parts of the digestive organs, which receive undoubtedly their stimulus from the brain through the medium of the pneumo-gastric nerves; whilst those of the life of relation, or the ganglionic system, having become irritated by the presence of more or less acrid matter in the inferior portions of these viscera, might have established there an anti-peristaltic action? Indeed, the invaginations had been formed at the inferior extremity of the jejunum, from whence they extended upwards to its superior end.

The following fact will contribute likewise to confirm the theory of the possibility of curing injuries of the brain, and prove, besides, that the meningeal arteries may be cauterized with impunity, if owing to the mechanical cause of the fracture, or in consequence of the operation of trephining, they should have been opened. This case will, moreover, make us acquainted with some other phenomena, relative to the doctrine of venous inhalation.

Claude L——, aged 27 years, a private of the second regiment of infantry, was, on May 13th, 1815, brought to the hospital of the guards. He had, in a duel fought on that day, received a sabre wound with a cutlass (*sabre de fantassin, briquet*), which besides the soft parts of the right temple, had cut off a portion of the *os frontis*, the entire anterior inferior angle of the parietal bone and a small corresponding portion of the great wing of the sphenoid, so as to make an oval piece of bone two inches long by one in width. In consequence of this wound, the external lamina of the *dura mater* had been cut into, and the two principal branches of the middle meningeal artery had been divided.

The subject dropped down after the accident, he having lost his senses. After having received the first assistance from the surgeon of the regiment, he was carried to the hospital, where he arrived extremely intoxicated, and bathed in his own blood. Notwithstanding the circumstances, the wound was dressed. After extracting first the detached piece of the cranium, which was still held by a few fibres of the temporal muscle, the blood furnished by the arteries above mentioned, it was thought, might be arrested by means of compression with tampons of charpie; but, several days later, after suppuration had already commenced, secondary hemorrhage supervened with renewed force. This accident occurred during my visit of the 19th instant. I gently took off the dressing and touched the osseous channels of the parietal bone, in which the two ruptured arteries lay concealed, with a small iron rod, curved backwards, and heated to incandescence, whereby the hemorrhage was instantly arrested. The patient was not at all sensible of the application of the red-hot iron, though we introduced it to the

depth of about three lines, between the dura mater and the cranium upon the channels above alluded to. From that time the dressings, having been reduced to every possible degree of simplicity, were made with safety to the patient.

The temporary compression of the brain which had been occasioned by the tampon had thrown the patient into a state of drowsiness; without its being productive, however, of any symptom of hemiplegia. Depletion from the jugular vein and the application of several lanced cups to the nape of the neck and between the shoulders dispersed these transient symptoms of an engorgement of the cerebral vessels. Subsequent to the cautery he became composed, the wound promptly suppurated again, and all the other functions were restored, without any apparent obstruction. In short, every thing promised a favourable termination, when suddenly, on the fourteenth day after the accident, symptoms of a greatly embarrassed circulation made their appearance, such as a small and threadlike pulse, with a marked intermission after every third pulsation. The patient experienced a kind of oppression in the praecordial region, the very slight heavings of which were scarcely perceptible; he sighed frequently, and complained of a troublesome and steady heaviness in the head, which he could not keep in an elevated position; nevertheless, his moral and sentient faculties had been preserved inviolate; he replied correctly to the questions addressed to him, and followed extremely well the thread of a conversation. The dressings of the wound gave him no pain, nor did he feel any at other parts of the head.

A small abscess had formed near the opening made by the lancet (in the jugular vein), which we opened. The collection of matter extended over the whole passage of that vein, which, however, appeared to us to be obliterated; but it is probable that the purulent matter, during the first few days of the formation of the abscess, might have entered the tube of this vein, and been sent, together with the blood, to the right auricle of the heart. The fact is that the force of the circulation had progressively declined; pulse and heat were entirely gone, while the patient yet spoke and urgently de-

manded an emetic in order to relieve himself from the weight which constantly oppressed him in the region of the heart, and where he constantly kept his hand. He finally died, after several convulsions, in the night of the 29th and 30th of the same month.

On inspecting the corpse, 24 hours after death, we noticed, in the first place, a complete rigidity of the extremities; the countenance had a marbled appearance, and the vessels of the conjunctiva were injected with blackish blood.

After sawing through the cranium on the left side, we noticed, in removing the dura mater from the internal surface of the bone, that the portion corresponding to the opening which had been left after the sabre-wound, was covered with bony granulations in which a lamina of the internal table of the parietal bone was buried. The dura mater nowhere presented the slightest sign of inflammation, not even where the actual cautery had been applied to the divided extremities of the meningeal arteries. The sinuses of that membrane and the vessels of the pia mater were turgescent with black and fluid blood. The latter membrane, as well as the encephalon, showed, likewise, no sign of inflammation. The lateral ventricles contained very little serum, but we discovered some, to the amount of about three ounces, beneath the two lobes of the cerebellum and in the spinal canal. The substance of the brain had acquired a somewhat greater density than is usually noticed in its normal state.

Upon opening the thorax we found the lungs pressed down and of a greyish colour. The whole substance of the heart exhibited one large mass, so as to fill up completely the cavity of the pericardium, which was almost entirely destitute of serum. The right auricle we were greatly astonished to perceive filled and distended with an albuminous concretion of a yellowish colour, tolerably solid, and extending itself by a thick pedicle into both *venae cavæ*. There was neither blood nor coagulum in either ventricle, while on the contrary we found some still in the arch of the aorta and about the origin of its principal branches.

The abdominal viscera presented nothing of pathological interest; even the liver was healthy.

From these facts it will clearly appear, 1. That the fall of the patient in cases of injuries of the head, as we believe to have demonstrated, does not sensibly affect the liver, with the exception of a direct shock: 2. That the cauterization of the meningeal arteries, in the manner in which we have done, did not and cannot occasion any unpleasant effects, and that this remedy is the easiest, simplest and safest measure for the purpose of arresting hemorrhage from those arteries which run within the furrows of the inner surface of the cranium: 3. That the death of the subject is to be ascribed principally to the obstacles which the black blood has encountered in the pulmonary passages, and to the successive and gradual cessation of the general circulation. This is what induced the passive and doubtless inflammatory engorgement of the cerebral vessels, as also the extinction of the vital or nervous principle.

But, what may have been the causes of the formation of these albuminous concretions? We were informed that this soldier used to take ardent spirits in large quantities and that he was intoxicated at the time of his entering the hospital. It is also probable that he may have succeeded in procuring some during his illness, and whenever he found himself getting better from his wound. Possibly, some purulent molecules of the abscess, formed over the course of the jugular vein, might, as we thought, have penetrated into its tube, and descended into the auricle in such a manner as to favour the formation of these concretions, aggravated as they were no doubt by the use of ardent spirits, to the use of which the patient, at least before the accident, had been given.

*Fifth observation.*—The loss of recollection of the substantive nouns, or the incapability of pronouncing them, will no doubt in some instances exist only for a short time: at any rate we have had occasion to notice that circumstance in the case of one Charles Blanc, a private of the second regiment of infantry of the royal guards. This soldier, who was 24 years old, and whose frame strongly resembled that of the negroes,

had, on November 12th, 1821, received a thrust with a foil, behind the external orbital apophysis of the left side.

The lounge being a powerful one, had affected him so violently, that, whilst rising, after the fall, which had instantaneously occurred, he found himself deprived at once of speech, sight, and hearing; and he had evinced some symptoms of mental alienation. A strange pain in the head had become developed, and continued, together with the other symptoms, until his admittance into the hospital the next morning, which determined me to make a copious depletion from the right temporal artery. This was scarcely accomplished, when he experienced a decided relief; his senses returned partially, and the intellect entirely: the features of the face, however, and his looks remained still a little discomposed.

*November 15th.*—There was a fluctuating tumour and a sharp pain at the orifice of the puncture, in consequence of which I dilated this small wound. The temporal artery of the same side having been divided by the bistoury, I allowed the blood to flow for a short time, before I applied a ligature. This effusion contributed still more to the state of tranquillity of the patient, and accomplished a complete restoration of his senses. Four or five days afterwards, no other clearly marked sign of the wound and its consecutive effects remaining beyond the crucial incision which had been made, there was reason to expect that this improvement would continue, till it was completely cicatrised. But, all at once, the appearance of symptoms of gastric derangement, of fever, and several convulsive motions, announced the existence of some internal irritation. The patient had some twitches in the right side, and experienced an inexpressible feeling of uneasiness at the epigastric region; the appetite declined, and a paralytic condition of the stomach seemed to have been induced. The senses became embarrassed again, and it was at that moment that Blanc for the first time was observed to pronounce neither proper names, nor substantive nouns. It was surely not the remembrance of these words which he had lost, but rather the faculty of articulating them; for if, for example, somebody asked him his name, he imme-

dately looked for the ticket lying beside his bed, and showed him the name written upon it; if some pieces of money were shown him, he in like manner specified their number on his fingers. If his snuff-box was presented to him, and he was asked to name it, he seized it eagerly, saying: *It belongs to me, it belongs to me.* This reply, so little analogous to what he was asked, proves moreover an occasional alienation of the mind, or at least some deficiency of intellect; in fact, to the various questions addressed to him, instead of using the words "*It belongs to me,*" which in preference he frequently pronounced, he ought to have returned under all circumstances, the same language which he made use of in some, and answered thus: I cannot say, I do not remember.

For the purpose of overcoming the gastric disorder, a gentle emetic was forthwith directed; the lint with which the ori-fices of the incisions were covered, was spread with storax; scarified cups were applied to the shoulders and the epigastrium; and finally a rigid diet, an infusion of chamomile, a composing draught and a bolus of camphor and nitre were prescribed. This treatment, which was pursued for several days, and which was afterwards followed up by the application of a moxa over the epigastric region, and of two more behind the ear, over the course of the facial nerve, (*nerf petit sympathique*) caused the train of symptoms which had come on, entirely to disappear. The simple phenomenon of the forgetfulness of the substantive nouns continued to the same extent for seven or eight days longer; but, at the end of that time, Blanc began to pronounce his name, mine, and those of others. He forgot and remembered them again at intervals. At length, the application of several moxas sufficed to strengthen his memory; for three weeks after admission into the hospital he was discharged, after having completely recovered that faculty.

Injuries which affect the parietes of the cranium may give rise, besides, to a train of symptoms different from those last described. Neuralgic affections of a more or less decided character, may be the consequences of fissures of the internal table of the bones, of laceration and inflammation of the meninges, although the brain itself, and the functions over which it pre-

sides, shall remain inviolate, particularly when the inflammation of its sero-fibrous membranes should become merged in that of the mucous tissues which line certain cavities, corresponding with the base of the brain, such as the frontal and sphenoidal sinuses, &c. The neuralgic symptoms will, therefore, be more especially observed, after injuries which have occurred near those cavities, and still more so, if their parieties should become involved in them.

Though their primary cause, as we have stated just now, consists in an inflammation of the membranes above alluded to, yet neuralgiæ nevertheless seem to originate more particularly in acute or chronic inflammations of the nerves arising from the brain or spinal marrow. They are ushered in by smart, acute and shooting pains which travel along the course of the nervous cords, and extend as far as their more or less remote branches. These pains are almost always accompanied by convulsive motions of the corresponding muscles, by an increase of sensibility and temperature of the parts affected, especially at their accession, which is attended by redness and swelling. These various symptoms usually have their intermissions, according to the changes of temperature, the idiosyncrasy of the individuals, their age, and according to the derangement of some habitual discharges to which they were subject, &c. Such is most generally the career of neuralgic disorders in ordinary cases; in others they present an infinite variety of anomalies, according to the diversified genera of nervous affections; but we do not know that there have been as yet observed any of the singular phenomena which were exhibited in the individuals of the two following observations.

A young grenadier of the horse guards received, during a cavalry maneuvre, a violent kick from a horse, which divided the integuments of the right eye-brow and fractured the external wall of the frontal sinus. After profuse hemorrhage which had instantaneously taken place, he had lost his consciousness and the use of all his functions of sensation and locomotion; but, several hours later, after he had come to again, he complained of extremely acute local pains, while convulsive motions were perceptible in the lips and jaw.

On my first visit I freely dilated the contused and lacerated wound of the eye-brow, and afterwards extracted several loose splinters which pressed against the cavity of the frontal sinus. This operation facilitated the discharge of a very large quantity of black coagulated blood which had become accumulated there. During the act of expiration the air issued from the wound, and the blood immediately afterwards flowed from the nose. After the dressing, which was done in the most simple manner, some blood was taken from the temporal artery, and cups were put upon the nape of the neck and between the shoulders; mustard pediluvia and a mild, antiphlogistic regimen were prescribed. During the first few days the mental faculties appeared to us to be disordered, his memory was gone entirely, and the pains continued. The patient was bled again, and the use of diluents was persevered in. Notwithstanding these measures, symptoms of frenzy manifested and developed themselves with great intensity; and fever and delirium supervened. Soon after which latter symptom a lethargic drowsiness came on, and he expired in convulsions on the nineteenth day after the accident. During all this time he seemed to us to have suffered the most excruciating pains in the head: the dressings of the wound, although made with gentleness, were exceedingly painful, and caused almost always convulsive motions in all the muscles of the face, neck and arm of the same side, while the left arm was benumbed, and threatened with paralysis.

On examination after death, we discovered a most intense inflammation and swelling of the mucous membrane of the frontal sinus and of the nasal fossæ, a scarcely perceptible fissure in the posterior wall of the sinus, together with deep seated inflammation of the corresponding portion of the dura mater and a sanguinolent, serous effusion between this covering and the anterior right lobe of the brain. The pia mater was inflamed likewise to a great extent and covered with suppurated spots; the substance of the brain, and particularly that of the right hemisphere was dense, and the vessels going into it were greatly injected; a pretty large quantity of reddish serum was found accumulated in the ventricles. The mucous mem-

branes of the larynx and pharynx were red and inflamed, the bronchia filled with reddish mucus, and the lungs engorged and of a brown colour. The abdominal viscera were healthy.

The rapid career of the inflammatory and nervous symptoms had at first inclined me to the belief that the extreme sensibility of the pituitary membrane had chiefly contributed towards their development; but the following case has proved to my satisfaction that their principal cause should be referred to the fissure in the internal table of the frontal bone and to the rent of the fibrous texture of the meninges. I believe nevertheless that the inflammation of the Schneiderian membrane, through its sympathetic influence over the whole system of organic life, has largely contributed to aggravate that of the meninges, for we found again in the air passages all the traces of the same inflammation. The older surgeons, therefore, did not, without reason, consider the injuries of the frontal sinuses as most serious, especially when the air passed into the nasal fossæ; and it is consequently on that account that they recommended the closing up of such wounds, or the utmost precaution in order to prevent, as much as possible, the contact of the external air with the fine and exquisitely sensible membrane of the intricate cavities of the sense of smell.

The subject of the second observation is one James Raymond, a cuirassier in the second regiment of the guards, 25 years old, of dark complexion and vigorous constitution. He received, on January 21st, 1822, while engaged in cleaning his horse's hind feet, a kick from him, on the right eye-brow and over the passage of the superior orbitar margin. The kick had been so violent, that the external table of the frontal sinus had been shivered to pieces, and he completely fell on his back and occiput, lost his senses entirely, and lay as stiff as dead on the ground. A profuse hemorrhage took place from the nose and ears. The surgeon of the regiment, after having dressed him temporarily, had him sent to the hospital, where he arrived in the middle of the night. On my visit in the morning he was still unconscious, with his head turned to the left; the eye of the wounded side, and the ecchymosed eye-lids which covered it, protruded considerably. A tetanic rigidity had

already manifested itself along the whole right side of the body of the patient, who moreover was taken with stupor, icy coldness, and all the symptoms which betoken a speedy dissolution. During my visiting tour, his head was shaved, and embrocations of hot camphorated vinegar were made over the entire surface. I next proceeded to dress the wound, which I dilated freely and in every direction; I extracted the most movable bony splinters, as also several clots of blood which were locked up within the sinus; during the operation, the patient lost a good deal more blood from the nose and by the incisions which we had made. Scarcely had the first dressing been finished, when Raymond recovered the use of his senses and his reason; since which period he has never ceased to talk like the rest of the patients in the ward, and to follow with sufficient precision, every kind of conversation. I directed diluents, stimulating injections, mustard pediluvia and the application of ice to the head; in the course of the day, the general heat and the pulse became so far developed that the surgeon in attendance, as I had instructed him to do in this case, judged it advisable to bleed him copiously from the arm.\* In spite of all these remedies which were repeated during the following days, and notwithstanding two other depletions, the one from the temporal artery, and the other from the arm, the same excessive pains continued to exist, which, at the time of the lethargic waking of the patient, had come on in the occiput, and in the direction of the wound; and which were not quieted for a single moment, till after a deep incision which I made into an œdematosus swelling which existed at the right side of the occiput. In the mean time the suppuration of the wound of the forehead became abundant, and discharged itself in a great measure through the nose; the eye became unloaded and the ecchymosis disappeared gradually, but the patient found himself deprived of sight on the wounded side.

\* It is a great, and sometimes fatal mistake, to bleed immediately, every body that has had a fall or received any wound or injury. Such bleedings augment the state of collapse, and frequently deprive nature of the few remaining resources to re-establish the equilibrium between the enfeebled vital functions.

From the fifteenth to the twentieth day, after several small splinters which had eluded our search, had been discharged by the wound, and facilitated its cicatrization, an increased nervous excitement manifested itself, and put the two extremities of the injured side in a state of violent contraction, which soon assumed a tetanic character. The deep seated pains which the patient steadily experienced at the whole right lateral side of the head, grew so intense that he could not bear the slightest and most gentle touch of that part of the body, without uttering screams, accompanied by horripilations and convulsive motions. I directed the depletions from the neck, arm, and foot to be repeated at proper intervals; numerous scarified cups to be applied to the nape of the neck, to the shoulders and the spinal column; the ice to the head, and the mustard pediluvia were continued. With these various remedies we succeeded in conducting the patient, who was alternately better and worse, to the forty-first day, at which epoch the tetanic symptoms of the two affected extremities suddenly increased. The muscles of these parts swelled prodigiously, and became unmanageable. The testicle of the right side became tumefied, and caused the patient acute pain. To our great surprise, the hair and whiskers of the same side stood erect, and the least touch or cutting of the smallest number of these hairy productions, although made with a very sharp pair of scissars, conveyed excessively painful feelings. This experiment has been repeated a great many times by the medical officers of the hospital and by other physicians.

This extreme exaltation of the animal and organic sensibility of every tissue of the affected side, induced me to think that a deep fissure in the right occipital region must have occasioned a rent of the dura mater and an effusion beneath that membrane and over the tentorium of the cerebellum, or immediately under the right lobe of this portion of the brain, extending, no doubt, as far as the commencement of the spinal canal, whereby an inflammation might have been produced, involving the origin of the corresponding nerves of the medulla oblongata, as well as that of the nerves of the medulla spinalis of the same side, embracing at the same time, the neurileme and the substance even

of their trunks and principal branches. The circumstance of all the parts of the opposite side remaining undisturbed must depend upon the fact that the medullary fibres in the parts of the encephalon which we had just now occasion to name, do not decussate in the same manner, as we have already observed in some of the preceding cases. And it is doubtless owing to the circumstance of the effusion, confined as it was to these parts, being unable to rise as high as the superior surface of the cerebral lobes, that there could not be perceived any mental alienation; the recollection of the substantive nouns alone was suspended for some time. The loss of sight and smell of the side affected seemed to us to depend upon the direct or indirect lesion of the nerves appertaining to these senses. As to the organ of speech the functions of which were with difficulty performed, I believe that the existing restraint was dependent on the compression which the great hypo-glossal nerve of the same side experienced at its origin, or at its passage into the posterior condyloid foramina.

More difficult to explain, is the painful trichoma of the hair and whiskers which could neither be touched nor cut in particles ever so small, without giving the patient the most lively pain, accompanied by horripilations, convulsive motions, and sweats. Can the substance of the hair itself be a conductor of animal and organic sensibility? that seems impossible! or can it be owing to the shock occasioned by the percussion they undergo from the scissars which cut them, or from the instrument which touches them, and which impression is transferred to the bulb or root, where the nervous fibrillæ are situated? this appears more likely. I do not know how to solve such a question: to the physiologists therefore must we leave it to institute such inquiries as will lead to the discovery of the true cause of this singular phenomenon. Nevertheless, these hairy productions have not undergone any change either in their form or thickness; they have acquired merely a somewhat deeper shade than the hair of the left side of the head.

I had expected that these symptoms would not have any other but a transient existence, and that they would promptly yield to the general and capillary depletions which were persevered

in; to the application of a blister over the whole right temporal region; to several applications of caustic potash to the nape of the neck and to the mastoid region; and, finally, to several moxas and the actual cautery which were equally and in succession applied to the neck and to the anterior part of the right shoulder; but these various remedies produced no other than momentary effects. The patient never could bear the exhibition of narcotics, not even in the smallest doses. I wanted to try also the effects of the cold, or nearly cold bath, and of the prussic acid, latterly so highly spoken of by Professor Tommasini. The bath could not be borne at any temperature, and the use of the distilled water of the cherry laurel, given in the dose of eight to ten drops at most, in four ounces of mucilage, caused the development of some febrile action, violent colic, and a bloody dysenteric discharge.\* I suspended its employment almost immediately. No remedy had yet succeeded in subduing completely the violent inflammation which existed; on the contrary, the local pains increased, towards the middle of March, to such a degree that the patient maintained that the bones of the cranium were drawn asunder as if by a pair of pincers: the tetanic contraction of the muscles advanced to such a height, that the extremities of the fingers buried themselves in the palm of the right hand, without any one being able to prevent it, the trapezium delineated itself, as it were, through its cutaneous covering, and the pectoral muscles of the right side, swollen and contracted as they were, had the appearance of a considerable tumour; at length, the increase of sensibility and erectile of the hair, had reached so high a degree, that he could no longer bear the ice upon his head, nor any other kind of cataplasm. It became necessary to lay every thing aside, excepting a simple retaining bandage, loosely applied, as that of Galen for example, which gave him some little relief.

Notwithstanding this state of suffering, during which he nevertheless continued to improve, by means of the general

\* Having since tried this remedy repeatedly in the same doses and with the same intentions, it has in this individual invariably produced the same results.

and topical depletions which we repeated a great many times (the number of bleedings amounted to thirty, and the number of scarified cups to upwards of one hundred), by means also of the pleasant mucilages given internally, and the emollient, and nearly cold baths, this soldier had retained a certain freshness and embonpoint; because, in fact, the functions of organic life had never been disturbed, save by the momentary action of the prussic acid. It was in this situation that, on April 26th, 1822, we presented him to the Medical Society of the Faculty of Paris, where the above mentioned experiments were repeated. The cutting off of several hairs, although it was done with excellent scissars, and unknown to the patient, was equally accompanied by horripilations, convulsions, and some kind of painful tremors which spread over all the contracted parts as far as the extreme ends of the fingers and toes, which were doomed to endure a very troublesome pricking sensation.

When, at length, copious and steady sweats, excited by great heat of the body, had again produced a slight improvement in the symptoms, Raymond expressed his wish to leave the hospital. He accordingly went out, August 18th, seven months having elapsed since the occurrence of the accident. At that period I observed that a diminution of the pains, and emaciation or atrophy seemed disposed to succeed to the tetanic contraction. This, indeed, is the course which nature commonly pursues in bringing about the organic changes, the first effects of which are irritation, acute inflammation and hypertrophia, either because the causes of excitement have ceased, or because the nerves have lost their sensibility in consequence solely of the long continuance of the inflammatory condition into which they had been thrown. The circulation is disturbed, and lowered, and the parts sink into a state of atrophy which may increase gradually, or progressively, according to the effects of this retrograde movement of the circulation and absorption.

The suspicions which we had entertained on account of the gradual increase of the atrophy in this soldier, had actually become realized, when an additional excitement in the parts still under the influence of tetanic action, being occasioned by some

departure from his regimen, compelled him to return to the hospital in the early part of January 1823. The testicle, toes, hand, fore-arm, and the lower portion of the upper-arm of the right side were almost entirely wasted away. The nails had attained a rough and crustaceous shape and a length of about eight or ten lines; but, during his second stay at the hospital, this horny growth fell off spontaneously, and made room for others of a more natural formation. This effort of reproduction was, in my opinion, a sign indicative of improvement. From that period, sensibility and motion appeared to us to become developed in the fore-arm and head of the patient; and some time later, at the hotel of the invalids, where we had obtained for him the privilege of admission, a further improvement occurred; but it was at Charenton, where his impatient and wilful disposition had prevailed on him to go, that all the properties of the diseased limb were completely restored under the influence of emollient baths and of affusions of cold water, to which he was forced to submit, and which, far from being injurious to him, as was the case at the hospital, proved, on the contrary, eminently serviceable.

Till now, the object of our observations has been to point out the differences which exist between the lesions of every essential part of the encephalon, and the particular phenomena which are characteristic of each of them, with a view to be enabled to establish a correct prognosis, and to indicate in a more or less exact manner, the therapeutic means which may be adapted to them. At present we intend to proceed to the consideration,

1. Of those injuries of the head which indispensably require the operation of trephining.
2. Of those on the other hand where this operation, contrary to the assertion of the majority of writers, is not merely useless, but may be hurtful.
3. Of what is proper to be done in the case of hernia cerebri.
4. Of the causes of abscesses of the liver, subsequently to injuries of the head.

In this part of my work I shall add but little to what I have

said already in a memoir of mine inserted in the fourth volume of my campaigns, published in 1817. I shall, therefore, support the propositions which I have just now laid before the reader, by a series of authentic observations which I have collected with the utmost care, and which I shall introduce in succession with every possible degree of brevity.

*First Proposition.*—The trephine is indispensable, when in a wound with fracture and shattering of the bones of the cranium the fragments are displaced or driven into its cavity, in such a manner as to infringe upon the dura mater and brain;—when the foreign substance which has been the cause of the injury is wedged within the space of the fragments, or when it has made its way into the interior of the cranium, without its being moved from the roof of this bony receptacle;—and lastly, when it has been ascertained that there is a circumscribed effusion of some fluid established in the same parts.

Previously to performing the operation of trepanning, it is of primary importance to know whether the symptoms really exist, which characterise a lesion or compression of any part of the encephalon. One of the leading symptoms is paralysis, more or less extensive, of the parts which correspond, or are opposite to the injury, in proportion to its effects upon one or the other region of the brain. These symptoms are the more readily recognized as they show themselves immediately after the accident, and become gradually and progressively developed, unless the fracture be confined to the anterior wall of the frontal sinuses and the foreign body be arrested within their cavities. In the latter case, which may be readily distinguished, the invasion of the symptoms of compression will be expected in vain. It will not, however, in that case, be the less requisite to expose the fracture by appropriate incisions,\* to

\* In making the incisions, the lesion of the branches of the frontal nerve should be avoided as much as possible; or if this cannot be done, care should be taken to divide them completely. The puncture of these nerves may occasion the loss of sight in the eye of the same side, and sometimes be the cause of tetanus, while the complete section of these nervous cords will not impede the functions of those which are appropriated to vision.

apply a trephine of a diameter proportionate to the extent of the walls of the sinus, so as not to exceed its limits; and to extract finally the foreign substance. The same rules are applicable, when similar bodies have insinuated themselves into one of the fossae of the superior maxilla, such as the orbital, nasal and zygomatic fossæ and the maxillary sinuses: yet, rough and protracted examinations may, under such circumstances, be fraught with danger to the patient, for they might produce symptoms even more serious than those which could result from the presence of the foreign substance in these cavities.

There are yet some other remarks to be made before we decide on performing the operation of trepanning on any one of the different regions of the cranium. In undertaking it with a view of extracting any foreign substance that may have made its way into this cavity, this substance, as we have said, must lodge interiorly at the margin of the passage which it has made for itself; for, if it should have become lost in the parenchyma of the brain, it would be useless to search for it at all. Even if it should have been arrested by the substance of bones, provided its presence there do not threaten the life of the patient, the operation should be deferred, or rejected altogether. Now where the foreign body do not or cannot injure any important organ, if its extraction cannot be conducted without violence, it will be better to relinquish it to the efforts of nature, which, setting on foot a necrosis, attended by a perceptible exfoliation, or by means of decomposition, accomplishes, in the end, the destruction of the superficial bony circle which retains and covers it. Having subsequently become loose, and being gradually expelled its prison, by the development of some subjacent vascular action, it may be removed with scarcely any assistance from art, and without the least inconvenience.

A foreign body having obtained access into the interior of the cranium, and remaining fixed at the place through which it has penetrated, may be discovered with perfect ease by the slightest tap of the probe. We may be deceived, however, and doubt its presence, because of the smallness of the opening, which pretty frequently occurs under such circumstances, es-

pecially if the foreign substance be of a round form, like a bullet, or any similar projectile. The explanation which we propose to give on that head, will sufficiently point out the possibility of the passage of a foreign body, and put surgeons on their guard with respect to such an occurrence. The osseous fibres, at the moment when they are struck, will, previous to their being ruptured, yield and bend under the weight and pressure of the instrument which has caused the injury; but, this resistance being once overcome, those fibres have a tendency to return into the straight line, and to approach each other by converging, in consequence of which they diminish the opening through which the foreign body had been enabled to enter, and which may even become narrower in proportion as the elasticity and strength of the textures may be greater, as I have had frequently occasion to notice in young subjects. In old people, on the contrary, the bones, instead of bending or yielding, shiver into pieces, and the projectile can only surmount the resistance it meets, by carrying away a piece equal at most to one-half of its diameter. The greater or lesser size will, however, again depend upon the spongy or compact nature of the bone; whether of the former condition, the perforation of this tissue will, most frequently, be effected without fracture.

A foreign body need not necessarily remain fixed at the place through which it found its way into the cranium, without rendering, on that account, its extraction from it impossible. Thus, if a body which has been thrown with force, strikes against the walls of the cranium, it may, after having passed through the bony substance, by following its parabole, run between its roof and the dura mater over a space more or less extensive; and finally stop at a point diametrically opposite to its entrance. In such a case, the existence of which may be inferred also from the symptoms of compression which invariably show themselves, and from the pains which the patient refers to some place more or less distant from the wound; the only point is, to ascertain, precisely, the presence of the foreign body, and the distance at which it is lodged. With that object in view, a gum elastic sound is to be introduced,

with every practicable precaution, through the aperture in the cranium, and is to be pushed onward till it meets the foreign body, which may be recognised easily enough by its resistance, and by the inequalities which its surface most usually presents. By measuring afterwards externally, with the same instrument, the route which this body has taken, the place will be thus pointed out where the counter-opening and the operation of the trephine should be made. This idea, to which the results of several gun-shot wounds of the cranium had led me, struck my illustrious preceptor, Sabatier, with so much force, that he has quoted it in the first volume of his "*Médecine opératoire.*" Besides, here are the facts which have suggested it to me.

A soldier had, in Egypt, received a gun-shot wound on the head. The ball, after penetrating through the frontal bone at its middle, and near the sinus, had travelled obliquely backwards, between the cranium and the dura mater, and passed in this way over the whole extent and on the left side of the longitudinal sinus as far as the occipital suture, where it stopped. Its presence had developed the whole train of symptoms of compression, without our being able to fix upon the resting place of the foreign body; the patient, however, continually referred the seat of pain to a spot diametrically opposite to the entrance of the ball, which, with the other symptoms, left no doubt of its being lodged in the interior of the cranium. I contrived to pass a gum elastic sound through the hole in the frontal bone, and succeeded without trouble, in reaching the ball, which I recognized by its resistance and inequalities; after which I measured externally, the route over which it had travelled. I now resolved upon cutting down to the point of the cranium which corresponded to the situation of the extraneous substance. I made a counter opening with a large trephine; a pretty large quantity of purulent matter, mixed with small clots of blood, was discharged, and enabled me to seize and extract the bullet which depressed the dura mater, and compressed the brain. Nothing further opposed afterwards the completion of the cure.

During the campaign in Poland, in 1806, I had a second

time occasion to make a similar counter opening. A ball, after having penetrated through the left parietal boss of one of our soldiers, had grazed the internal surface of the parietal bone in an oblique direction, and lodged about half an inch from the occipital suture. The introduction of a small gum elastic sound, the signs which the patient gave, and a slight ecchymosis appearing on the scalp, which had been shaved in that direction, determined me to cut down to the bone by making a crucial incision. A small fissure became at once perceptible, besides which there were symptoms of compression which continued to increase. These additional motives induced me to apply the crown of a trephine large enough to cover the fissure. I discovered, immediately beneath the piece detached by the instrument, one half of the ball flattened and partially incrusted with bone. The dura mater was separated from the roof of the cranium, along the whole course of the ball, which corresponded with the concavity of the scull; a pretty large quantity of black blood issued from both openings. A fortnight subsequently elapsed without the patient experiencing the slightest inconvenience, and, like the subject of the preceding observation, he would, doubtless, have been perfectly restored to health, but for an attack of hospital fever, to which he fell a victim.

These two cases prove, in opposition to the opinion generally admitted by authors, that to search after foreign bodies within the cranium is not always a useless nor even a dangerous practice, provided that it is done prudently and with adroitness.

If, finally, under similar circumstances, or in the more simple cases of which we have previously spoken, the operation for trepanning be deemed necessary as to the point of fact itself, it is yet requisite, before undertaking it, to know how to select the time best calculated to render it serviceable, and to discern whether the period elapsed since the occurrence of the injury, be not a new objection to its being performed. If the surgeon is called to a patient in the course of the first few hours after the accident, he ought to avail himself forthwith of these moments in order to perform the operation, if it should be indicated, and to extract by these means the foreign

bodies which bear upon the dura mater and the brain. For then there is every reason to believe that the symptoms of inflammation which ordinarily do not become developed till after the first twenty-four hours from the time that the injury has been received, and which would be a weighty counter indication, have not as yet made their appearance. If there be ever so little delay, inflammation supervenes; from which it will be evident that the trephine can be applied no longer, without its being productive of additional irritation, which even would be increased in proportion as the pericranium scraped off is more or less extensive, and the crowns more or less in number, as also in proportion to the possible existence of some atmospheric phenomena, such as the moisture and insalubrity of the air. The membranous portions being laid open, undergo, if once inflamed, a rapid change of structure; and it is a rare occurrence if they be not very soon attacked with gangrene. We have witnessed several instances of this, which, doubtless, influenced Desault to perform this operation no more. Acting upon the rule laid down by us just now, it will, therefore, be necessary, previous to the application of the trephine, to wait until the inflammatory symptoms are dispersed. The presence of the extraneous substance from which the effects of cerebral compression result, is less dangerous than the trials made during the stage of inflammation to dislodge or extract it. Again, the death of the patient, always unavoidable whenever inflammation and suppuration are extensively established in the membranes of the brain, or in the substance proper of the latter, would, if the operation were performed at this time, take place with even more despatch than if he had been relinquished to the sole resources of nature.

Had we, moreover, any desire to enter into the details of the inconveniences attendant upon the operation itself, as it is commonly performed, we should speak of the practice of scraping the bones as one of the most serious. For the membranes are torn by it far beyond the spot where the crown is intended to be applied; it provokes or augments the irritation of the neighbouring tissues by destroying the osseous ramifica-

tions; it brings on a necrosis throughout the whole extent of the denuded bone, and it is commonly the cause of more or less serious sympathetic disorders, as, for example, of abscesses of the liver.

Previous to the use of the rasp, a circular incision should be made with a bistoury through the pericranium and its adhesions to the integuments, after which this portion of fibrous membrane, thus isolated, will subsequently be detached without effort.

But, when at length the operation is finished, a piece of fine sponge, previously moistened and wrung out again, should be fixed in the hole made by the trephine; a perforated linen rag, spread with cerate, be laid over the borders of the wound, with soft charpee on the top of it, after which it should be covered with a simply retaining apparatus, such as the bandage of Galen. The balsam of Fioraventi and other irritating repellent lotions should be thrown out of surgical practice. The dressings should be simple: the first of which should not be taken off until the suppurative matter shall have soaked completely through all its pieces, and then every proper precaution should be taken to shelter the wound from coming in contact with the cold and moist air. Care also should be taken to promote the alvine evacuations by injections, as well as the mucous and cutaneous secretions, in order to keep off irritation and congestions from the wound, or from those organs which are susceptible of becoming sympathetically disordered. Diluent mucilages and scarified cups to the nape of the neck, to the dorsal and epigastric regions, will fulfil this indication perfectly, and prevent inflammation.

We now propose to relate some facts in support of our first assertion, that it is absolutely necessary to extract foreign substances by whatever means in our power, and to let out the fluids effused within the interior of the cranium.

*First Observation.*—Peter Auger, a fusilier grenadier, had, during the Austrian campaign, been struck by a ball on the right temple. The projectile, in fracturing the corresponding squamous portion of the temporal bone, had been divided into two portions, one of which had penetrated into the cranium,

while the other remained buried in the temporal muscle. Symptoms of concussion and compression immediately appeared and threatened the life of the patient. After dilating the wound and applying ligatures to several branches of the temporal artery which had been divided, I laid bare the whole of that portion of the cranium, and soon discovered the first fragment of the ball, which came off of its own accord. I next raised, with an elevator, a splinter of considerable size, and was fortunate enough to seize, with a pair of dressing forceps, the other fragment of the ball, which was flattened and sunk deeply between the dura mater and the cranium. Aided by this accidental trepanning, a pretty large quantity of black and liquid blood was discharged. From that moment all the symptoms subsided and dispersed gradually; and the space which was the result of the exfoliation of the periphery of the opening having rapidly diminished, the patient had perfectly recovered before the expiration of the forty-fifth day. The cicatrix was depressed, and the pulsations of the cerebral arteries had not yet entirely disappeared.

*Second Observation.*—During the battle of Witepsk, in 1812, a young Russian soldier had been struck by a biscayan at the frontal region, a little above the right eye-brow; the ball afterwards had pierced and fractured the os frontis, and penetrated into the interior of the cranium, where it lodged against the apex of the right anterior lobe of the brain, against the orbital projection of the os frontis and the internal crista of the same bone. Notwithstanding the size of its volume, it was but very little perceptible on the outside; the opening to be perceived measured no more than three or four lines in diameter; the attempts and efforts to extract it had, therefore, proved ineffectual.

When I saw the patient, he felt a sensation of restraint and an extremely unpleasant heaviness in the head, which constantly obliged him to sit up and support his head on his knees, for whenever he raised it upwards and backwards, he would faint away. The tap of the probe upon the visible part of the foreign body convinced me that it was an iron ball, the size of which must greatly exceed the diameter of the opening

through which it had entered, and that consequently it could only be extracted by the application of the trephine.

The wound of the integuments, having been dilated by two longitudinal incisions, exposed the whole circumference of the opening into the frontal bone, upon which we applied three small trepanning crowns which communicated between each other and the hole made by the biscayan; after cutting off the angles of bone which they had left standing, it was an easy matter to extract, with a strong pair of forceps and an elevator, the iron ball, which weighed not less than six ounces, (and which has since been deposited in the cabinet of the School of Medicine at Paris.) By means of a wooden scoop we evacuated entirely a large quantity of coagulated blood, and extracted several small fragments of bone which proceeded from the fracture of the superior wall of the frontal sinus. The vacuum, thus resulting from the loss of so much bony matter, was filled up with a portion of fine sponge, previously moistened and wrung out again, and held by a thread so as not to suffer its internal side to sink below the level of the margin of that large opening. The borders of the wound were covered with a fine perforated linen rag, spread with cerate; soft charpee, compresses, and Galen's bandage completed the dressing.

From that moment the patient found himself relieved, and enjoyed a comfortable sleep for nearly two hours; however, towards evening he had some heat, fever, and a smart pain in the wound. A copious depletion was made from the vena saphena, and the patient was put upon diluents and anodyne antispasmodics. The dressing was not renewed until the fourth day after the operation, at which time every part of the bandage was soaked through with sero-purulent matter. The next day I found him in a most satisfactory condition, and without the least disturbance of the functions of sensation. Some time afterwards, his recovery had become complete, with the exception of the depression near the cicatrix, and the vacuum still perceptible on account of the loss of substance of the frontal bone. This cure was announced to me at Moscow by M. Roussel, the surgeon-major of the hospital.

*Third Observation.*—In the same battle another Russian soldier had been struck on the left temple by a leaden ball, one half of which had penetrated into the cranium and become flattened across a narrow fissure which the shock had produced; while the other half had furrowed the temporal muscle as far as its posterior attachment to the base of the mastoid process, where its career had been arrested.

At the time when I saw the patient, five days after the occurrence, the whole right side was palsied; he had lost the use of his senses and was in a state of continual agitation. The wound of the temple having been dilated, and the place of fracture exposed, I discovered the course which the lead had taken through the muscle, and extracted it, by making a counter opening first at the place where the foreign substance projected. I next applied a trephine to the descending portion of the wound, very near the spot where the other piece of lead was wedged in. After which it was quite easy to dislodge and to extract it, together with several other splinters contiguous to it. There was also a quantity of blood extravasated between the cranium and the dura mater, which I let out accordingly.

The patient felt relieved at once, but some days afterwards he sunk into an adynamic state, from which he did not recover. It is evident, that if the operation for trepanning had been performed sooner, it might have been possible to save him.

*Fourth Observation.*—A private of the ex-guards, who had been wounded at the battle of Moscow, presented to us nearly the same symptoms as the individual of the preceding case. He had been struck by a ball, which, after fracturing the middle and posterior part of the right parietal, had become fixed between several pieces of bone. The fragments, propelled by the projectile, had been forced under the cranium. The ball, which was believed entire, had passed out again through the same opening. It was thought sufficient simply to dilate the wound and to apply a common dressing over it.

As the symptoms of compression progressed so slowly, it was supposed that the patient could recover without an operation, and depending throughout on the resources of nature,

the trephine, which we had advised, was obstinately rejected; however, the symptoms went on increasing, and the patient died on the twenty-first day. The autopsy of the cranium detected a fourth part of a ball and a splinter imbedded in the dura mater and the corresponding portion of the brain, where a pretty extensive ulceration was observed. It is probable, that, if those foreign bodies had been extracted in due season, the patient might have been saved.

We have also witnessed some analogous cases in which the operation of trepanning was likewise not ventured upon from an apprehension to derogate from the precepts of the celebrated Desault, who looked upon it as mortal. We coincide also in this opinion, but only when the foreign body has departed from the internal face of the roof of the cranium, and penetrated into the substance of the brain; and, we repeat again, that, under such circumstances, it will surely be better to relinquish the patient to the "médecine expectante," than to venture upon any attempt at searching into the interior of this pulpy organ.

In order to give additional strength to the precepts so long established in our mind, as may be seen by a reference to the dates of the foregoing cases, we deem it incumbent upon us to add to the above two concluding observations which we have collected quite recently. We anticipate that, together with those already recorded, they will contribute to show clearly that if, towards the end of the last century, the proportion of injuries of the head, requiring the operation for trepanning, has been exaggerated, it has been latterly too much the fashion to stigmatize this operation, and to perform it accordingly too seldom.

*Fifth Observation.*—John Baptiste Mossant, a cuirassier of the second regiment of the royal guards, twenty-six years of age, attended a manœuvre, at the Champ-de-Mars, on June 11th, 1824, when his horse, which was newly shod, stepped abruptly and rudely aside, threw him down, and kicked him violently on the head, in consequence of which the bones of the cranium had been fractured, and he was placed in the utmost danger. His comrades of the same troop of horse flew

to his assistance, but found him senseless, weltering in blood and covered with dust. Notwithstanding their doubts about his life, they hastened to raise and transport him instantly to the hospital of Gros Caillou, where I was yet engaged in making my visiting tour. He had then recovered from his syncope, but could give us no account of the accident which had just happened to him.

After he had been undressed and lodged in a separate apartment, and the apparatus necessary for the dressing being in readiness, I directed the whole head to be shaved, and afterwards made a careful examination of the wound, which occupied, in a transverse direction, the entire superior part of the right temple. The integuments, as also the temporal muscle, were irregularly divided down to the bone, to the extent of about two inches and a quarter, and the temporal portion of the frontal bone was fractured and splintered, the pieces having sunk inwards. As there were, however, no decided symptoms as yet of compression, I contented myself for the present to dilate the wound freely, and to lay open the whole fractured portion of the frontal bone; the pericranium covering it was circularly divided and detached from the bone by means of the rasp; several branches of the temporal and frontal arteries were tied; the whole wound was covered next with fine perforated linen, spread with cerate, which served only to keep the angles of division slightly approximated; charpee, square compresses, and a bandage of Galen, completed the dressing. We prescribed venesection from the arm, acidulated diluents with ice, the application of sinapisms to the feet, and of ice to the head.

On my evening visit, the patient being much agitated, and the pulse still full and vibrating, I bled him copiously from the jugular, and recommended the frequent re-application of ice to the head, as well as the liberal administration of cooling sedatives. He passed a restless night, and the surgeon in attendance bled him again from the arm.

On my visiting him in the morning of the 12th, he was comatose, and laboured already under marked hemiplegia of the left side; lying on the injured side, he was at times in a

state of extreme agitation, endeavouring to tear off the dressings with which the wound was covered. His ideas were incoherent, and he replied with difficulty and very imperfectly to the questions addressed to him. His pulse was small and exceedingly languid; counting scarcely forty-five pulsations per minute. The alvine evacuations were suspended; the abdomen distended with flatus; the feet habitually cold; and besides, he had incontinence of urine. The dressings being removed, we discovered the whole wound cleansed from the blood with which the evening before it was filled, and were, therefore, better able to appreciate the nature of the fracture and of the indented fragments. We noticed distinctly that the largest of them, being of a square shape, leaned against the roof of the cranium, beneath the fractured margin of the frontal bone. A very small quantity of bloody fluid, of a blackish colour, escaped through the superior fissure of the fracture. Several attempts carefully made by us, proved that the depressed pieces were too firmly wedged in to be extracted without the operation of trephining, and as we were convinced that they, more or less extensively, compressed the dura mater and a portion of the right lobe of the brain, in such a manner as to endanger the life of the patient, we hesitated no longer to perform this operation on the spot. This could be done now the more easily, as the wound had been dilated with that intention on the preceding evening, and as the portion of bone, over which the crown was to be applied, had also been scraped. I selected that part of the frontal bone, where the rays of the superior transverse fracture united themselves to that which descended towards the squamous portion of the temporal bone, with the intention to meet the more easily the piece which had been depressed in that direction.

This operation was soon and successfully accomplished; the fractured piece of bone being extracted, there issued from it about a tablespoonful of black and fluid blood, which had been effused between the cranium and the dura mater. Now, as soon as the teeth of the cylindrical saw had encountered the fracture itself, it was sufficiently easy to separate the principal depressed piece, which had removed under the cranium for

several lines. During the extraction, the two tables of this portion of bone, which are held together by their diploë, had become disunited; in the vitreous table we observed one of the furrows of the middle meningeal artery (*artère sphéno-épineuse*), the laceration of which had doubtless contributed to the extravasation between the cranium and the dura mater, to which we have alluded already.

Scarcely had the operation been finished, when the patient experienced an immense relief; he accurately replied to the questions which were put to him, and a few hours later the symptoms of hemiplegia had dispersed. This sudden change in the cerebral functions has appeared to us very remarkable; for the derangement of the dura mater and the brain had been deep and very extensive, and the depression of these parts, upon which the two displaced splinters immediately bore, amounted in our opinion to several lines. Some smaller splinters of a triangular shape were, also, extracted from the periphery of the opening into the cranium. We made him incline his head for the purpose of discharging all the extravasated fluids, and for the loss of bony matter we substituted a fine and well washed sponge; strips spread with cerate were placed over the angular borders of the divided integuments, and the dressing was completed by layers of charpee, by compresses and a six-tailed bandage. Ice was again applied to the head, and several stimulating injections were given to him; mucilaginous diluents with ice added to them were also persevered in. The pulse having risen, gave after the dressing fifty-five to fifty-six pulsations per minute. The patient complained of burning thirst and wanted incessantly to drink. We hold ourselves warranted in ascribing this phenomenon to the sympathetic irritation which the eighth pair of nerves had been subjected to, in consequence either of the lesion of the temporal nerves, or perhaps in consequence of the direct or consecutive compression which the brain had momentarily sustained.

On visiting the patient in the evening, we found him composed, enjoying a comfortable rest; we, therefore, made no change in our prescriptions. However, in the course of the

night he had several fits of delirium and some febrile heat, for which the surgeon in attendance thought proper to bleed him a fifth time from the arm.

During the ensuing day nothing untoward occurred, and he seemed steadily to improve. On the third day after the operation, the dressing was taken off, when it was already bedewed with a pretty large quantity of bloody serum. A perceptible pulsating motion which had not manifested itself at the time when the trephine was applied, had become developed and made us even apprehensive of hernia cerebri which we believed to have prevented, rather than subdued, by the application of fine sponge into the breach of bony matter and by the simple and seldom repeated dressings made without the addition of spirituous substances and aromatic tinctures, so highly recommended by some authors.

After the fifth day we allowed the patient some chicken broth, but continued still with cooling drinks and the application of ice to the head. The latter remedy has in our estimation most efficaciously contributed to prevent the inflammation of the fibrous membranes and to disperse that which already existed. We opened a pretty considerable abscess which had formed in the substance of the superior eye-lid, and which had been the result of a small fracture, caused by contre-coup at the external wall of the frontal sinus of the same side. A small lamina of bone subsequently discharged itself from the opening of this abscess, which afterwards cicatrized quickly and of its own accord.

From the ninth day the patient was out of danger, and advanced in fact rapidly towards recovery. A great many small fragments exfoliated from the whole periphery of the trepanned and fractured parts; the margins of the other bony pieces which had remained sound, approximated each other by becoming thinner in such a manner as to close, though incompletely, the immense chasm which the trephine and the exfoliations of bone had left behind. At length, by the first of September of that year, the wound had entirely cicatrized, and with the exception of a somewhat impaired condition of his memory, he had again acquired his embonpoint, and en-

joyed good health. He was presented to the Academy of Surgery at its last meeting in the month of August.

After this statement, it certainly can no longer be doubted that the cuirassier, to whom the accident just related had occurred, was indebted for his life to the operation of trephining, which in his case had been performed at the most suitable period and on the most favourable situation. We believe, therefore, that, under this consideration, the case in question will not be destitute of interest.

*Sixth Observation.*—The individual of whom I am about to speak now, was infinitely less fortunate than Mossant. This soldier, of the name of James Gabriel Laroche, was a gunner in the artillery of the guards, twenty-five years old, of a robust constitution. On June 17th, 1824, he was brought into the hospital, on account of an attack of complete hemiplegia of the whole left side, accompanied with some deviation or contraction of the right commissure of the mouth. He was in a state of mental stupor, and seemed to be insensible to the action of every external stimulus. When asked about the origin of his complaint, he would reply that it had become gradually developed, without his being able to assign any cause for it. After having examined, however, the head of this soldier, and discovered there in the hairy scalp, on the right superior side of the forehead, a perpendicular cicatrix of about one inch and a third in length, which at its external margin formed a bump, painful to the touch, in which sensation the whole corresponding region participated likewise, he informed us, in answer to our renewed questions as to the cause of this cicatrix, that six or seven weeks previously he had received a sabre wound on that spot, for which the surgeon major of his regiment had attended him. The edges of the wound, which had the appearance of being a deep cut, had united by the first intention, that is to say, with the aid of adhesive strips, agreeably to the rules laid down by the majority of authors. Indeed, the integumentary edges had in the course of a very few days formed a reciprocal adhesion. Before the ninth day, the cicatrix was completed, so that the patient, on the belief of being cured, returned to his regiment and resumed his duties which

he has continued to perform until he was attacked with hemiplegia, five or six days previously to his admission into the hospital.

However, the bump observable on the temporal surface of the cicatrix, the local pains with which the least touch of this part was attended, and the paralytic symptoms, made us suspect the presence of some splinters beneath the cicatrix and in the interior of the cranium. Being unable to receive any further explanation on this point from the patient himself, I sent for the surgeon who had dressed him, and on the positive assurance which he gave me that the wound had been a simple one, without cut or fracture of the bone, since it had united by the first intention, I gave up the idea which I entertained at first, of laying open the portion of the os frontis which was connected with the cicatrix, and of applying the trephine in order to extract the foreign bodies which appeared to me to compress a portion of the right hemisphere of the brain; yet my first opinion still prevailed, seeing that there was complete hemiplegia of the left side, languid and small pulse, a somewhat comatose state, and a very sensible diminution of the perspicacity of his senses, as well as of the sensibility of the whole system of the life of relation.

When at last, to my great regret, I was unable to perform the operation, I endeavoured at least to fulfil, by other depleting and revulsive remedies, the most urgent indication which presented itself. I immediately opened the right jugular vein and abstracted two large porringers full of black and carbonized blood, which, after twenty-four hours repose, I directed to be followed up by the application of scarified cups to the temple of the same side, to the nape of the neck and between the shoulders. Sinapisms were applied to the feet and ice to the head, with diluents internally. Two days later I ordered a large English vesicatorium to the right side of the head, and still later two moxas to the base of the cranium behind the right ear; and a drain was finally made between the mastoid apophysis and the inferior sub-occipital protuberance of the same side.

The symptoms of paralysis gradually dispersed, and I had anticipated to have saved the patient by this treatment, when all

of a sudden two abscesses showed themselves under the clavicle of the same side, which I opened by means of the caustic potash. About the time of their cicatrization, and in consequence of some act of imprudence on the part of the patient, a most alarming hemorrhage took place from the internal jugular, which was ulcerated near where it empties itself into the sub-clavian vein. This occurrence, however, was not accompanied with any disastrous consequences; the wounds returned to their former sanative condition, and the patient for several weeks did pretty well. But, sometime afterwards, symptoms of hepatitis, accompanied with an obstinate diarrhoea supervened at last, and reduced him to a state of marasmus which terminated in death, in spite of all the remedies which we employed in order to conquer this twofold affection.

On the 23d of August, the day after the death of this man (it being also the day of our clinical lecture), we proceeded to open his body, in the presence of Doctor L \* \* \*, and of the surgeons of the hospital. We took especial care to saw circularly through the cranium, in a line of demarcation of the base to the cap, so as not to encroach upon the cicatrix of the soft parts. After having separated these parts, we discovered a pretty deep groove in the frontal bone, beside which and separated from it, there was a small spot of dull white which belonged to its solid substance. The whole extent of the cut was red and inflamed, and the integuments covering it participated equally in this inflammation. A powerful resistance of the vascular adhesions of the dura mater to the cranium was experienced, whenever we attempted to separate them; within the cranium, and in direct relation with the external cut, we moreover observed two lamellæ of the internal table, separated from their diploë by several lines, and depressing in the same proportions the dura mater, and the subjacent portion of the encephalon. This part of the dura mater was inflamed, thickened and interspersed with suppurated spots; the pia mater presented the two first mentioned appearances even in a still higher degree. The cortical substance of the brain was in the same part softened and depressed; there was very little serum in the ventricles, and the remainder of the brain exhi-

bited nothing of pathological interest. The thoracic viscera were in a sound condition. As to the abdomen, the stomach and the intestines were in a phlogose state, and the sigmoid flexure of the colon displayed some slight ulcerations. The liver was much enlarged, and its parenchymatous substance was lined with suppurating tubercles and small abscesses, three of which, situated in the great lobe, were of the size of a hen's egg. The remainder of the texture of this organ was softened and of a greenish colour. This hepatic disorder had evidently been occasioned by the sympathetic irritation of the fibrous membranes of the head; and it is this disease, in combination with that of the intestines, which was most instrumental in causing the destruction of the patient.

This fact then proves in our opinion: 1. That the operation of trepanning, if made in good season, would have prevented these derangements and doubtless have saved the life of this gunner. 2. That animal sensibility appears chiefly to emanate from the superior layers of the cerebral lobes. 3. That the proper and isolated lesion of some one of the points of the hemispheres, invariably induces a paralysis of the opposite side, and that, if there have been observed some instances in which the paralytic affection has occurred on the affected side, it is owing to the circumstance that the cerebellum of the same side had been injured at the same time, or that the disease of the hemisphere of the brain communicated itself to the hemisphere of the other side. The explanation of these phenomena we have given already in a former part of this work. (See p. 96.)

*Seventh Observation.*—This case is one of those which incontestably corroborate the assertion set up by ourselves, as to the necessity of immediately applying the trephine in all cases of fracture of the bones of the cranium, combined with sinking of the fractured pieces, and with lesion or depression of the dura mater and brain. Some regard, no doubt, must be had to anomalies, or to some particular and unforeseen cases which the judgment of the surgeon will know how to distinguish; but, they can never invalidate a general rule, and this case will prove, moreover, that contrary to the opinion of

the older surgeons, the operation for trepanning may be performed fearlessly over the track of the branches of the middle meningeal artery, which in consequence of a fracture had been ruptured in the individual of the following case, who was a private of the first Swiss regiment of the Royal Guards, of the name of James Lehmann, aged 32 years. This soldier was brought to the hospital of the guards, almost moribund, in the morning of the 22d January 1826, on account of an extensive wound on the left side of the head, immediately below and a little in advance of the parietal boss of that side. The wound, which was of a form somewhat rounded and tattered at its borders, was accompanied with considerable denudation, with a fracture and some shattering of the parietal bone, the fragments of which were depressed and sunk to the depth of half an inch into the meninges and the brain. It was clear that this solution of continuity was the result of some contunding body striking the cranium forcibly and in a transverse direction, or that this man must have fallen full length, or from some elevated spot with a swiftness which was the much greater as the elasticity of his organs was in some measure suspended, owing to the profound intoxication in which he was at the time of the accident, and of his admission into the hospital. This circumstance prevented the patient from disclosing to us the mode of action of the offending body, yet we shall carefully describe its effects.

He had lost entirely the use of his senses and of his reason; the whole right side was palsied and the two limbs corresponding with the wound were frequently and immoderately agitated. The commissure of the lips of the same side was drawn firmly towards the ear; the pupils were much dilated and deprived of their motions; a bright light did not appear to make the slightest impression upon the organ of sight, and he could not utter a single word. The pulse, being small and feeble, gave scarcely 45 to 46 pulsations per minute; he discharged his urine involuntarily, and bled from the ear of the injured side; every symptom, in short, announced an early dissolution, and I believed the patient in such imminent danger, that when I was called to attend him (which was at four

o'clock P.M.) I hesitated for a few moments to undertake any operation at all. However, I applied the trephine, yielding to the advice of some of my colleagues, who assisted me, and amongst whom was Dr Lodibert, apothecary general to the hospital of the guards, and yielding, besides, to my own wishes to relieve the patient, without presuming to be able to save his life.

The head having been shaved entirely, and the dressings being in readiness, I dilated freely the lacerated and contused wound of the soft parts, by making a crucial incision to within about an inch of the boundaries of the fracture, which was completely laid open by means of the rasp, of which I made no use till after having circularly and thoroughly divided the whole pericranium, and the deep layer of the temporal muscle covering the circumference of the fracture. Several branches of the temporal arteries were tied, and the remainder of the wound was cleansed. We now perceived a piece of the parietal bone, of the size of a five franc piece, fractured, sunk, and wedged in, in such a way as to prevent the application and action of any elevator for the purpose of raising and extracting it. I then selected the most slanting point of the extremity of the fracture, in order there to apply the crown of a trephine so as to come in contact with the fracture itself. The trepanned piece being detached, a good deal of blood was effused through the opening; after which I immediately raised the depressed fragments with an elevator, and extracted them with a strong pair of forceps. Two splinters of the internal table lay deeply concealed under the roof of the cranium, which rendered their extraction difficult. The result of this was a circular and angular opening into the parietal bone of about one inch and a quarter in diameter. We found upwards of two ounces of blood partly coagulated and effused upon the dura mater; this being evacuated, the hemorrhage, which had never stopped, was occasioned by the ruptured branches of the meningeal artery. The dura mater being strongly depressed, no longer transmitted the motions of the brain; it is probable that beneath this membrane there may have existed also another effusion which I had no disposition to evacuate by inci-

sion, as advised by some authors, in as much as the action of the air upon that bruised or lacerated and exposed portion of the brain, might have accelerated its disorganization and been followed by a deep seated and fatal suppuration. By preserving the integrity of the dura mater, I had occasion to expect that the blood which was extravasated beneath, would be absorbed, and that the depressed portion of the brain would more readily develope itself, resume its vital properties and return to its primitive state; I therefore confined myself to the prudent resolution not to cut into this membrane, and hastened to stop the hemorrhage from the meningeal arteries. Pressure and styptics would have been hurtful and useless, and the application of a ligature to these vessels, concealed, as they were, in the hollow grooves on the internal table of the bone, being of course impracticable, I did not hesitate, as I had done in several other cases, to apply an iron probe, heated to incandescence, to the orifice of these arteries, in consequence of which the hemorrhage was instantaneously arrested. This kind of cautery is not attended by pain or any other inconvenience. The two-fold indication being fulfilled, I proceeded to dress the enormous wound itself. A slice of fine sponge, moistened and wrung out again, was, first of all, placed within the bony ring, so as to fill up all irregularities; a fine linen rag, perforated, and spread with cerate, was next laid over the whole wound, whose four corners were approximated; layers of charpee, compresses, and Galen's bandage completed the dressing. The operation had scarcely been finished, when the patient moved his right hand, and pronounced a few words. The pupils contracted, and his senses seemed to have partly at least resumed their functions.

Notwithstanding this favourable change, I did not entertain the least hope of the recovery of the patient, but attended him nevertheless with great care; he was put upon the use of cooling mucilages, and I directed the application of hot sinapisms to the feet, ice to the head, and venesection from the arm, as circumstances might require. Indeed, after two or three hours of perfect rest, fever having come on, accompanied by heat and burning thirst, he was bled twelve ounces, after

which I ordered a number of lanced cups to be put upon the nape of the neck, back, epigastric and hypochondriac regions.

The irritation and inflammation which, in injuries of the head, especially if they are combined with fractures of the bones of the cranium, (as it actually happened in this case) invade the membranes of the brain, transmit their effects sympathetically to the internal organs, which become thus the seat of a concomitant inflammation, for the removal of which laxatives have been supposed to be best adapted: but, these remedies are better qualified to keep up inflammatory action, and to cause its development, than to resolve it. We have consequently, never made use of them. We treat these sympathetic inflammations as if they concerned exclusively the organs in which they are seated; and the best remedies to overcome them, and to reduce that even of the meninges, are doubtless scarified cups (which, under all circumstances, are preferable to leeches), tepid emollient gelatinous baths if practicable, and mucilaginous drinks with ice added to them. I have constantly derived the greatest advantages from this mode of treatment, with which, during the first stage of inflammation, general bleedings if required, the application of ice to the head and of sinapisms to the feet, should be combined.

But, let us return to the subject of our observation. On the next day, January 23d, the patient was somewhat improved, and could reply to the questions which were addressed to him. However, as there still continued some symptoms of plethora, venesection from the arm, and the application of cut cups to the epigastric and right hypochondriac regions was repeated. Ice to the vertex, and cooling drinks were also persevered in. The dressing was not taken off until the fifth day, when the compresses were thoroughly soaked with purulent serum. For the sponge we substituted perforated linen, spread with cerate, which covered the wound entirely; over this an apparatus similar to the first, was applied, and the same regimen was continued until the ninth day. All the symptoms of inflammation and of traumatic fever having by this time disappeared, we suspended the ice and allowed him

rich broths, instead of the simple chicken water to which the patient had been till then restricted. At length, to our great and agreeable surprise, we perceived that the storm was appeased, and we began to entertain some hope for his recovery. Our zeal and attention were redoubled, and we dressed the wound ourselves daily, until the process of cicatrization commenced; several small fragments of bone exfoliated, one after another, and the cicatrix was completed on the 28th of April ensuing, it being the ninety-sixth day after the accident and operation.

The case as it is the result of this wound presents a depression of six or eight lines in diameter, at the centre of which there is a gap through which the pulsations of the brain may be felt; this gap will imperceptibly diminish, and finally disappear, at least to a very great extent. The same occurrence we have witnessed in other individuals, and quite recently in J. B. Mossant, an invalid, formerly of the second regiment of cuirassiers of the royal guards, who was the subject of one of the preceding observations. It is pretty well ascertained that the opening made by the trephine is closed, not only by stretching and attenuating of the osseous fibres and vessels along its margins, but even of the bones of the corresponding portion of the cranium which pursue the same method of concentration, as we have seen and propose to explain in another part of this work (*Clinique Chirurgicale*, Tom. II.). The reduction of the cranium occurs alike in those cases of epilepsy, which have been treated upon the revulsive and specific plan, if a hypertrophic state of the bones of the scull has been the cause of it. The study of these phenomena, which have never been observed before us, cannot fail to present objects of great interest to physiologists.

*Eighth Observation.*—We shall conclude the account of our experience on the results of the operation for trephining by a summary notice of the following case: the subject of which is one Caspar Zwald, a corporal of the eighth (the second Swiss) regiment of infantry of the guards, aged 22 years. On the 28th June 1828, about 6 o'clock P.M., this young man had been engaged in playing at nine-pins on the platform

of Montmartre, near a wind mill. Believing himself in danger of being struck by the ball of his companion, he suddenly started back so far as to be within the reach of the wings of that mill, where he was as soon caught by the corner of one of them, and thrown down several paces from it. Here his comrades saw him lying senseless on the ground, bathed in his own blood, which profusely issued from a deep wound at the top of the right temple, as well as from the ear of the same side.

With great difficulty, he was finally resuscitated, but unluckily, for the accomplishment of this first indication, they used whiskey for that purpose, it being the favourite liquor of this class of soldiers (Swiss). After having put a handkerchief on his head, he was brought into our hospital, where he arrived the same night, in a state of sinking, and extreme prostration. The surgeon in attendance confined himself to direct his head to be shaved, apply a simple dressing, and to prescribe cooling drinks.

At our visit in the morning we discovered, indeed, a stellated wound about one inch in extent, below the right parietal protuberance; in the centre of the wound, a fracture was perceived, with depression of splinters, extending far down under the temporal muscle into the whole substance of the inferior margin of the temporal bone. The patient was dejected, in a state of drowsiness, and evinced, already, symptoms of paralysis, throughout the whole side opposite to the wound; his pulse hardly beat 45 or 46 times in a minute. The examination with the probe, convinced us, likewise, of the shattering and sinking of which we have spoken. We now hesitated no longer in exposing the whole extent of the fracture, by making a crucial incision into the edges of the wound. It commenced by a curved and transverse line on the process of the parietal bone, and then descended along its angles under the muscle already mentioned as far as the centre of the temporal fossa. Between the two angles, three or four fragments of bone of several lines in diameter were felt, each having sunk deeply into the cranium, and riding upon one another. After having bared them of their fleshy adhesions, we made some ineffectual

attempts at raising them up; after which we decided upon the application of one or two trepanning crowns above the principal fracture, so as to raise and extract these pieces, if required, through the opening thus made by them. This part of the operation being done, a very large quantity of black blood, mixed with some streaks of vermillion, issued from the cranium. We seized several small and movable splinters, near the trepanned region, but could not extract the three principal pieces, which were driven about five or six lines into the dura mater, in consequence of which the latter was sensibly depressed upon the brain. A second crown was now applied, which we brought to bear upon the margin of one of these fragments; it was easily detached, and thus facilitated our raising the others, two of which were found to have pierced the meninges, and penetrated several lines deep into the proper substance of the brain. The extraction of these last pieces of bone, although it had been made with the utmost delicacy, was attended by discharging a few particles of the grey substance of this organ, which inclined us to augur unfavourably of our operation, or of the termination of the disease. Two branches of the middle artery of the brain having been divided by the fracture, and continuing to bleed, we applied the actual cautery to their mouths, whereby the hemorrhage from these vessels was instantaneously arrested; but we were surprised to see a profusion of black blood flowing from the diploic substance. The hole made by the stylet into the external table of the bone had already produced a jet of the same fluid, which had been very troublesome during the operation: this blood could proceed only from the numerous veins which creep between the two tables of the cranium and which in young subjects are considerably dilated, and more especially so in those of a scrofulous diathesis. Having assured ourselves that there were no more foreign substances in this part of the cranial cavity, after having cleared it from some clots of blood which still adhered to the margin of the bony opening, and after having cut off the acute angles which had been made by the application of the two trepanning crowns, we proceeded to dress the wound after our usual method, which consists

in filling up the perforated space in the bone, by means of a piece of fine sponge moistened previously and wrung out again, by covering the lips of the wound with fine and perforated linen spread with cerate, after which we finished by applying fine charpee, square compresses soaked in cold and weak camphorated vinegar, and finally Galen's bandage over and above it. The patient felt relieved and declared not to have suffered from pain till after the incision, which we had made at first into the integuments. The pulse had become developed, and his speech was much less embarrassed.

Having taken the precaution to keep the patient secluded in a chamber to himself, we prescribed for him cooling drinks, ice to the head, sinapisms to the feet, and venesection at discretion, which the medical officer on duty resorted to in the evening. He passed a quiet night, without any disturbance. On my visiting him the next day, he was in the most satisfactory condition, and I began to entertain some hopes for his recovery. The dressing was bedewed with a rosaceous serum; even the external pieces were coloured by it. Ice, mucilaginous drinks, injections and sinapisms to the feet were continued. Some little heat and turgescence having manifested itself towards evening, venesection from the arm was repeated, and a scarified cup was placed over the epigastrium.

Until the fourth day, nothing of consequence occurred; the patient had no pain, his sleep was tranquil, and every thing went on well. At that time the dressing was throughout renewed; when the sponge was removed, that part of the dura mater which had been laid open, already presented fleshy granulations of a healthy aspect, and its heavings were quite perceptible, the sponge was soaked through with purulent serum, and it seemed that there was no longer the slightest vestige of effusion within the cranium, for no fluid of any kind issued out of it. We then thought ourselves justified not to replace the sponge, and the wound was dressed simply with fine perforated linen, spread with cerate, soft charpee, and the other pieces above mentioned.

On that day, according to the report of the medical officer

in attendance, our patient, who had been visited by several of his comrades, complained of pain in the head and stomach, and frequently desired to drink. During the following night he was much agitated, and his sleep was often interrupted by fits of delirium. The next day we found him, indeed, in a state of exacerbation, the whole left side having been struck with paralysis. His pulse was febrile, the skin dry and hot, and he could hardly articulate a few incoherent words. Pressure on the stomach appeared to give pain, and the tongue was red. Suspecting some errors in his diet to have been committed, we inquired of the nurses, if, agreeably to the usage of soldiers, he had not been taking some ardent spirits. It may of course be expected that their reply was in the negative. After this, we stationed, to be sure, a watch near him; but the complaint progressively increased, and he died on July 5th, about 4 o'clock P.M., the eighth day after the occurrence of the accident. Previously to his death, he was seized with convulsions.

The day after the next, we inspected the corpse. After having taken off the dressing which covered the wound, we observed a hernia cerebri, filling up the opening in the cranium, and forming, on its external side, an exuberant growth of the size of a small hen's egg; it was of a greyish appearance and interspersed with injected blood vessels.

Whilst sawing circularly through the cranium, below the seat of the disease, an intense ecchymosis was discovered to exist in the left temporal region, combined with some attrition of the fleshy fibres of the temporal muscle. The whole encephalon was exposed in the next place: the portion of which the hernia consisted, was produced by the superior margin of a lacerated wound of the two substances of the middle lobe of the brain, penetrating as far as the medullary centre of Vieussens to within one or two lines of the cavity of the right lateral ventricle. The parietes of this cerebral wound were irregular, and of a greyish aspect; the remainder of the encephalon was softened, but without any characteristic inflammation. The middle and right fossa of the base of the cranium, on which the injured lobe rested, was covered by a thin layer of bloody coagulum, which showed to have been the seat of a con-

siderable effusion, and which must certainly have been evacuated during and after the operation of the trephine; there was but little reddish serum in the four ventricles and spinal canal. The part of the dura mater which corresponded with the wound had been torn in two places.

The thoracic viscera presented no morbid appearance. A pretty large quantity of fluid of an alcoholic odour was contained in the stomach, the mucous membrane of which was much inflamed and interspersed with patches of a brownish red, especially towards the pyloric orifice; the intestines were inflamed likewise; the other viscera were healthy.

*Remarks.*—There is no doubt that the injury of this soldier was of the nature of those which may be styled mortal, particularly if we, for one moment, reflect on the nature and mode of action of the offending cause. It has been even more violent in proportion as the winds were boisterous. The ecchymosis which we encountered at the temple of the opposite side proves also the intensity of the internal concussion, which, in our opinion, is another cause of ramollissement of the brain. However, it would not have been impossible for the patient to have survived this dreadful accident, if, on the one hand, he had not indulged in the use of ardent spirits, as we have reason to believe he did, and if, on the other, we had, according to our own precepts, postponed the entire removal of the first dressing to the seventh or ninth day. It is evident that the symptoms of intense gastritis must be laid, of course, to the ingestion of some highly irritating substance, entirely out of the way of our treatment, as the patient had been allowed only mucilaginous drinks. Now this could be nothing else but distilled spirits which the Swiss soldiers had brought him probably, as is their cruel custom to do with all their comrades treated at the hospital; whatever may be the precautions of the administration to the contrary.

This concomitant cause must necessarily have irritated the brain, the injured portions of which contracted some degree of erectile or bloatedness: the sponge having been prematurely withdrawn, this organ no longer met with any resistance; the encephalocele being thus produced, has caused all

the preexisting fatal symptoms to be developed, and promptly occasioned the death of the patient; which proves that in every case of extreme danger, like the present, it is all important, after fulfilling the first indications, not to disturb the dressing for some time, in order to prevent any new irritation, as well as the air, from coming in contact with the internal parts, to make the patient observe a rigid diet, and to follow it up carefully with all the antiphlogistic remedies at our command. We hope this clinical fact will not be lost upon practitioners.

Most authors have denounced the practice of applying the trephine over the frontal sinuses, as well as along the track of the meningeal arteries, on account of the uncertain depth of these cavities, and on account of the aërial fistulae which they conceived to be the invariable result, and which they looked upon as incurable. I have deviated from this rule in two cases of fracture of the parietes of these sinuses. The trephine was applied without much difficulty, and the operation succeeded.

Francis Berrard, a guide to the army, received, during the third assault upon St Jean d'Acre in Syria, a gun-shot wound at the right frontal sinus. The ball, in fracturing the external wall of the sinus, separated into two pieces; one of which passed along the forehead, ploughing through the skin to the extent of half an inch; the other made its way into the sinus and fractured its internal wall. This accident was followed by loss of consciousness and some slight symptoms of concussion and compression.

The external fracture was not very extensive, and could hardly have permitted the passage of one half of the ball. As the fragments had not been displaced, I was under the necessity of applying the trephine over the sinus, by means of which I succeeded in discovering the foreign body, as also a fracture of the internal wall of this cavity: I extracted the lead pretty easily by means of an elevator, besides which the opening made by the trephine allowed me to introduce a small conical crown, with the assistance of which I perforated the floor of the sinus without any further accident. Between the cranium and the dura mater there was some coagulated blood, which I evacuated. The symptoms subsided, and in a very few days

were totally dispersed. The margin of the trepanned orifice subsequently exfoliated; the holes were closed by membranous matter, and the cicatrization of the external coverings was promptly accomplished without any aërial fistula.

An analogous case occurred, during the same action, in the person of one Fromentin, a grenadier. Part of a ball had in like manner entered the left frontal sinus. The external wall had been reduced to fragments, easily to be separated; but the elevator had been required for the extraction of the ball, whereby the functions, deranged by this accident, had recovered their tone, and the patient was restored to health in an equally short space of time as the guide already spoken of.

*Second Proposition.*—Concerning the discrimination of the cases in which, notwithstanding the assertion of most authors, the trephine is useless, and even hurtful, and treating of the measures which under certain circumstances may be employed as a substitute for this operation.

Already, while considering the first proposition, we have, among the most weighty exceptions to the operation by trepan, pointed out those cases where foreign substances, although introduced into the cranium, may lose themselves in the parenchyma of the brain. A similar reserve ought to be maintained in all cases of fluids effused at a distance from the roof of the cranium, and with still more force of reason in such cases in which the seat of the effusion cannot be ascertained. Not less inadmissible is the trephine in all wounds of the head, complicated with fracture of the skull, whatever may be the extent of the fracture or the number of rays departing from it, provided that the bony fragments be not depressed, and no foreign bodies or symptoms of compression manifest themselves. The concussion of the brain is mostly not so great in extensive wounds, attended with loss of substance of the soft parts and fracture of the bones of the cranium, because the effects of the shock from the offending cause are lost in the external parts affected, especially when it has operated in the diagonal of the cranial vault. Now, therefore, as in such a case the internal parts are not molested, absorption of the effused fluids proceeds

more rapidly; the fractured pieces afterwards gradually re-unite, and the patient recovers by the unaided exertions of his own constitution; hence the trephine, without doing any good, can only retard the cure. Finally, the exhibition of the following facts will, better than the most lucid theory, decide upon those cases, where the trephine is not merely useless, but even may do mischief.

*First Observation.*—M. \*\*\*, store keeper to the army, whilst at Berlin, in May 1812, had been thrown down by one of the carriages of state, which had been going at a most rapid rate. The head sustained its shock on the cutting edge of a large stone; the skin of the forehead and the scalp were detached as far as the occipital protuberance, so that this enormous flap hung down over the neck and ears.\* The cranium was entirely exposed, and in some places deprived of its periosteum. There was a stellated fracture on the left frontal boss, one of the rays of which extended to the parietal bone of the same side. There was no sinking down, or displacement of the bony fragments.

The following day, whilst I saw the patient for the first time, he suffered lively and incessant pain; he was delirious and deprived of his reason, and had nervous twitches; his pulse was tight and the countenance livid. Preparations had been made to apply the trephine, which the fracture just mentioned seemed to indicate; but we suspended it for the present, and contented ourselves with simply dressing the wound. After having removed all the foreign bodies and shaved the whole external surface of the flap, we made several incisions into its substance near the base, and into the neighbouring and contused parts of the pericranium, for the purpose of facilitating the discharge of the fluids; one of these incisions corresponded with the fracture. The wound was washed with warm and sugared wine; the flap was re-applied and kept in its natural position, by means of some adhesive strips and a fine perforated linen rag; several

\* This sort of wound gives an idea of the torments which the savages of the interior of North America formerly inflicted upon the tribes vanquished in the wars which they reciprocally made upon each other.

layers of charpee, compresses and Galen's bandage completed the apparatus.

The disgorgement produced by these incisions, and the opening of a vein of the foot, dispersed towards evening the pain and delirium and quieted the system; and when at this time new symptoms of inflammation supervened, he was once more bled from the jugular, and mucilaginous drinks, sedatives and anti-spasmodics were prescribed. Notwithstanding these measures he was much agitated during the two ensuing days. At length, the intensity of the symptoms declined; a seropurulent discharge made its appearance, and on the sixth day the first dressing could be taken off. The flap had formed fresh adhesions in many places and suppuration became established. In order to promote the separation of the sloughs which covered the edges, a perforated piece of linen, spread with storax, was laid over them. All other treatment was continued as before.

Suppuration became now very abundant; the patient's strength decreased, and he was attacked with adynamic fever. We prescribed acidulated mucilages with ice, and ordered the whole surface of the body to be rubbed with ice cold camphorated vinegar. In addition to the above, he had vomiting of bilious matter and an involuntary alvine evacuation. The auspicious moment was employed to administer an emetic; consisting of one scruple and a half of a strong and cold infusion of ipecacuanha, and one grain of tartarized antimony, which was followed by copious vomiting and plentiful and very fetid alvine discharges.

The succeeding night he had an increase of fever with delirium, and a fixed pain at the occiput, towards the base of the flap. The application, over this part, of two scarified cups removed the pain as if by enchantment; however, as there remained still some tension in the nape of the neck, as well as some constraint in the motions of the head, we directed a large blister to be placed over it, and for the state of weakness into which the patient had sunk, we prescribed powdered Peruvian bark, in an infusion of Arnica and Serpentaria Virginiana, with an addition of some sulphuric ether. The next day, it being the

nineteenth after the accident, the patient, who till then had been in a state of drowsiness, recovered the use of his senses, and from that time forward continued steadily to improve.

The wound, being of a vermillion appearance and filled with fleshy granulations, was disposed to cicatrize, which process, however, would not take place until after the exfoliation of several small bony fragments, and of one, in particular, which, because it had embraced both tables of the bone, had left a portion of the dura mater exposed.

Since our return from Russia, we have had occasion to see this officer again. He enjoyed perfect health, but has remained bald, and lost almost entirely the recollection of proper names. The other mental functions were unimpaired, and seemed to perform their office with precision.

This singular fact and the cure itself are two circumstances worthy of notice. If, in conformity with the opinion of writers, and that of many physicians who saw the patient, the trephine had been applied, there was every reason to believe that he would not have survived the operation. Indeed, it is probable that the dura mater, which no doubt had been already inflamed ever since the third day after the accident, by the fresh exposure and irritation from the trephine, would have been promptly attacked by gangrene.

*Second Observation.*—M. Giraud, major of engineers of the ex-guards, while superintending the works for the explosion of a mine at Moscow, was struck severely on the head by a large fragment of stone. One of its sharp angles divided the integuments of the superior and posterior part of the cranium, and caused a radiated fracture at the posterior angle of the left parietal, and at the superior angle of the occipital bone. The wound measured about two inches and a half in extent. He did not fall after the accident; nor did he lose his consciousness; but was sensible merely of some local pains. The intellectual functions had not been impaired, and there was no symptom of compression of the brain or of paralysis of the extremities; a slight traumatic fever supervened on the third day. Meanwhile, the trephine was considered as the only means from which some advantage might be derived, in consequence of

which four irregular flaps had been already made in the centre of the wound and a part of the cranium rasped, when M. Ribes and myself were consulted. On account of the little intensity of the symptoms, we deemed it necessary to postpone the operation, to approximate even the four flaps, and after washing and cleansing the wound, to cover it with some fine perforated linen, steeped in hot wine. The dressing being thus accomplished in the plainest manner, the patient was directed to have lemonade and some antispasmodic draughts.

The pain and irritation having subsided, and the patient having undergone so marked an improvement, the operation of trepanning was no longer thought of. Several small pieces of bone of the cranium exfoliated subsequently, and soon after the cure was completed. The cicatrix was large, adhering, and displayed at the centre a pretty considerable loss of substance. The cerebral functions had not been impaired in the least, and this officer enjoyed perfect health after the retreat from Russia.

*Third Observation.*—I shall now conclude the account of the cases bearing upon our second proposition, by relating the following fact, the details of which have been communicated to me, during the campaign in Austria, by M. Caizergues, surgeon major's mate, at the same time when he sent me the scull of the individual who was the subject of it.

On the 23d March 1810, a private of the 61st regiment of infantry, having in sport, shot at Christopher Cros, one of his comrades, in the fullest conviction that his gun was not loaded, the latter was thrown down, and had his head from the middle of the forehead to the left side of the nape of the neck, pierced through entirely by a large piece of ramrod which had been inadvertently left in the musket. The two ends of this ramrod, being of equal thickness, projected externally to the cranium, for about two inches. Notwithstanding this severe injury, Cros had retained sufficient strength to make the journey from the spot, where he had been wounded, to the ambulance, (a distance of one league and a quarter), partly in a cart, and partly on foot. There was no hemorrhage from the nose or ears, nor had any of the functions of the life of relation become disordered on the road.

After several trials to extract this foreign substance by its anterior extremity, a piece merely of about five inches in length had been pulled out with the pincers used for that purpose; and from the broken surface it appeared that what is called a flaw had been the sole cause of its breaking off. Several further attempts to draw out the portion remaining within the cranium by its posterior fragment, had proved abortive, and it seemed even that the strongest pincers and the utmost exertions had been made towards the accomplishment of this object, for the fragment was bent and marked by the grip of the instruments. With the view, at length, to extricate or dislodge it more readily, it was thought best to apply the crown of a trephine as near as possible over the spot of the cranium from whence the ramrod protruded. Contrary to all the principles of surgery, and in spite of the danger of such an operation, it was performed on the margin of the occipital foramen, and within a few lines of the posterior condyloid foramen. It must have been necessary, therefore, to divide the thick layers of the trapezius, splenius and complexus muscles, with their blood vessels and nerves, in order to reach the bone. M. Caizerques has said nothing of the difficulties which he must necessarily have encountered, nor of the phenomena which during and after the operation must have arisen; he merely states that it had been useless and that he had been obliged to give up the extraction of the ramrod. He has nevertheless dropped the remark that this soldier, who expired on the 25th, two days after the accident, had borne the operation with the utmost fortitude, and that he had not even been deprived of his senses.

On examination after death, the real course of the ramrod and the parts injured by it were fully ascertained. The os frontis had been pierced through between the two sinuses, by making an opening of a round shape, without fracture, and nearly of the diameter of the ramrod, which had originally passed in an horizontal direction between the two hemispheres of the brain, without injury to either of them, and lacerated only the point of the falx. The iron afterwards had forced itself into the substance of the sphenoid bone, underneath the

left optic foramen; it had then pursued its career through the extremity of the petrous portion into the cuneiform process of the occipital, by making an inclination towards the left condylloid apophysis of this bone, over which it had passed at its base; and finally it had appeared again through the posterior condylloid foramen.

Throughout its whole career the ramrod had not wounded one important organ. It had not touched any of the lobes of the hemispheres of the brain; but had glanced under the carotid artery and the cavernous sinus, without injuring either, and even was found separated from this sinus by means of a lamina of bone which it had almost detached from the body of the sphenoid; finally, it was found sufficiently remote from the third pair of nerves, as well as from the internal jugular vein.

The resistance offered by the bones, their elasticity, the breaking of the projectile power, all contributed to arrest the march of the foreign substance which had remained wedged in a large portion of the bony channel through which it had passed.

The inspection of the cranium of this man naturally suggests two questions. 1. What might have become of him, if he had been left to the sole resources of nature, bestowing, of course, such attentions on him as his condition should demand? His death seemed unavoidable; but at what time would it have overtaken him? We are unable to form an opinion, as we have not seen the patient, and as we, therefore, do not know the extent to which his organic and cerebral functions had been involved. The investigation of this point seems to have been totally neglected. If we consider, however, the absence of every serious symptom, the apparently unimpaired integrity of the functions of his intellect, of his senses and of the powers of locomotion, as Cros could, after the accident, think and act so freely that he travelled on foot part of the way, and that he requested to allow the ramrod to remain, supporting his request by stating that he suffered but little pain and uneasiness from it; considering all these circumstances, we cannot help thinking that the operation ought to have been post-

poned to such a period, at least, as when it would have seemed to be imperiously required. 2. On the other hand, what advantage could possibly have been derived from it, supposing even that it could have been performed without danger? As the measures previously employed for the purpose of extracting the ramrod, such as the use of pincers, &c., had proved ineffectual, so the trephine could add nothing to the efficacy of the former; therefore it was useless. But, independent of the difficulty of applying it in the most deeply seated direction of the occipital region, may it not have been injurious also to the individual? The cerebellum, or at all events the dura mater, must have been wounded by the teeth of the trephine; for the part of the trepanned bone exhibited within its substance a very marked difference in different places of the periphery of the opening, and it is well known that lesions of the cerebellum are extremely dangerous. Writers, therefore, have sufficient reason for insisting that, in the application of the trephine to the cranium, the circular line which forms the demarcation between the cap and the base of the cranium, should not be overstepped. In this case, there must have been, consequently, less danger to be apprehended from its presence than from the disturbance which it was supposed to have occasioned in the interior of the cranium, and the opening of the body has proved in reality that it might have remained there more or less long, without causing the death of the individual, as there was none of his organs injured. This example justifies the aphorism of the illustrious father of medicine: *Experimentum periculosum, judicium difficile.*

The result of our observation made in the cabinet of natural history of the city of Koenigsberg, in Old Prussia, respecting a wound of the cranium which a knight of the Teutonic order had received, seems to confirm our speculations on the preceding fact. This knight had been wounded on the forehead, by a javelin, the point of which had broken off in the cranium, and remained there for the space of fourteen years, without interfering with his occupation. Subsequently to this period, a collection of matter was formed at the base of the frontal region, in which the point of the weapon was observable; its ex-

traction had been made without difficulty, and resulted in the recovery of the individual.

*Third Proposition*, concerning the mode of treatment in cases of hernia cerebri.

Before I venture upon the consideration of this proposition, a question, highly important, yet difficult to answer, naturally presents itself: what is the cause capable of producing hernia cerebri through an opening which has been made into the cranium, either by some offending substance, or by the operation of the trephine? Without presuming to give a perfect solution, I shall, nevertheless, endeavour to present it in such a light as may lead to the path of truth.

According to our experience in a great many cases, the irritation which is centred in that part of the brain corresponding to the opening into the cranium, may depend as much upon its contact wth the external air, as on the presence of any foreign substances. The encephalon, traversed as it is in the literal meaning of the expression by innumerable fasciculi of arterial ramifications, must undergo a spontaneous movement of expansion, the effects of which will be the more perceptible as the parietes of the cranium no longer present an equal resistance at all points of its cavity. Thus, if a single portion of this bony wall be wanting, the corresponding part of the brain, being now no longer opposed by it, yields to the impulse and to the dilation of its proper vessels; this part then begins to swell, escapes through the opening, and immediately occasions the hernia. By degrees this fresh growth increases, and forms outside the cranium a tumour of more or less volume, in which certain phenomena of vital expansion, not to be observed in health, become subsequently developed. Any pressure exerted upon these cerebral excrescences occasions a sensation of weight throughout the whole extent of the wound; and if the pressure be continued, the patient will experience nausea and pandiculations; the functions of sensation are disturbed, and syncope supervenes.

If the tumour be cut off, the divided extremity will form a new growth, which, if cut again, will be alike reproduced. In other respects such excisions cannot be made without their being

productive of very serious mischief, followed by death. We witnessed an example of this in the Saxon army, 1813. Whilst visiting the hospital of the arsenal at Dresden, I saw one of our wounded soldiers who had just been dressed, die a few minutes afterwards, in the most dreadful convulsions. We learned, and the removal of the dressing confirmed it, that agreeably to the rules laid down by authors, the surgeon had deemed it necessary to cut off a pretty considerable portion of brain which constituted the hernia through an opening of about half an inch in diameter, occasioned by the extraction of a splinter. During the operation itself, there occurred nothing but a slight syncope, preceded by disposition to vomit and by frequent gasping.

Writers have also recommended to compress these tumours, and some have proposed to make use of plates of lead for this purpose. Such a method, as well as the application of alcoholic and astringent lotions may bring on fits, by increasing the irritation, and by disturbing the exercise of the vital properties of that portion of the brain with which they come in contact.

What, therefore, should a surgeon do in a case of encephalocele occasioned by some accidental loss of the substance of the bones of the cranium?

It is, first of all, proper to observe, that an extensive hernia of the brain is one of the most formidable occurrences incidental to injuries of the head, and that it is a very rare circumstance if they who have become subject to it survive. The development of these herniæ presupposes an exceedingly exalted state of the irritability of the pia mater and the cerebral blood vessels, as well as a deep seated inflammation within the parenchymatous substance of the brain itself, which it is difficult, if not impossible, altogether to cure. Again, the usual means which have been devised for the purpose of repressing them, so far from causing them to return, are instrumental only in the development of the causes of these exuberances. We have seen all the individuals perish to whom these remedies were applied; only one, in whom the hernia was not so voluminous, while the treatment was conducted in the simple manner of which we intend to speak, escaped indeed the symptoms de-

scribed above; the tumour gradually returned, and the patient recovered.

This treatment consists in applying over the protruded cerebral substance, a fine and perforated piece of linen, soaked in oil of chamomile slightly camphorated, and in directing our principal attention to the removal of the cause of internal excitement, and of the mechanical irritation externally. With this object in view, it is necessary to extract with proper care every extraneous body, as far as it is practicable to preserve the injured parts from coming in contact with the external air, to prescribe an antiphlogistic diet, and finally to apply the dressings with the utmost gentleness, and in such a manner that the apparatus shall not make any kind of pressure upon the sensitive parts. If the hernia is susceptible of being reduced, nature, thus assisted, will accomplish it by degrees, and the protruded portion of brain will return entirely into the cranium, like the epiploon, when it has escaped through a wound of the abdomen.

*Fourth Proposition,* being an investigation of the causes of abscesses of the liver, subsequently to injuries of the head.

A great many hypotheses have been advanced one after another, in order to explain the causes of abscesses of the liver subsequently to injuries of the head, as well as the sympathetic relations supposed to exist between the brain and liver; and they have been more or less countenanced, in proportion to the period and celebrity of their authors. I shall not attempt to inquire again into those which have already been the object of the debates of the former academy of surgery and of authors; I shall limit my observations simply to the opinion which in our days appears to be most generally adopted.

The celebrated author with whom it has originated, refers the causes of the formation of these abscesses to the direct or indirect concussion sustained by the liver, at the same moment when the offending cause has produced the injuries of the head. In support of this opinion, the author says: "that those wounds which are occasioned by the immediate shock of the cranium, in which the concussion is confined to the brain, and does not extend to the other viscera, are never

complicated by abscesses of the liver, an evident proof that the connexion existing between the diseases of the liver and brain should be ascribed to the simultaneous shock sustained by these two organs." (Nosographie Chir., 4e edition, 1815.) This explanation is accompanied by a number of cases and experiments made on forty dead subjects.

We shall confine ourselves to the following remarks:

1. The cases which the author produces, do not appear to us to stand in an exact relation throughout with the injuries of the cranium, at least not in the sense of the actual question before us. The subjects of the two first died twelve or fifteen hours after the accident, and it so happened, during the violent fall which they had had from some very elevated place, that the bodies of these persons having been accidentally thrown upon the right hypochondrium, the liver, friable and dense as it is, had sustained such a shock that it must necessarily break and become lacerated to a greater or lesser extent, while the integuments of the thorax and abdomen might have escaped unhurt. This phenomenon resembles that which a musket ball, at the termination of its career, produces upon the soft and rounded parts which it strikes; and the same will apply to the wheel of any vehicle which should pass over the same parts; therefore, these derangements of the liver may occur, in the instance of the fall of individuals, without there being the slightest injury of the cranium or the brain. We have witnessed this repeatedly, and the injury either of the liver or the encephalon, though occasioned by analogous causes, may very well exist separately. Of this there is here an example. A domestic was brought to the military hospital of Gros Caillou, on the 13th February 1817, on account of a severe fall which he had had from his horse, in the trenches of the Champ-de-Mars. The weight of the body chiefly rested on the right hypochondrium. He died a few hours after admittance into the hospital. On opening the body, which we did two days afterwards, we found the integuments of the whole body sound, the abdomen tympanitic, the right hypochondrium much more elevated than the left; about two pounds of black and bilious blood had been effused in the cavity of the

abdomen; all the floating viscera of this cavity were inflamed; two rents were observed on the concave surface of the liver, the volume of which was reduced, and the texture of the corresponding sides, being softened, crumbled at the least effort; the intercostal muscles and the right side of the diaphragm were ecchymosed. It is evident that the cause of this almost sudden death must be attributed to the laceration of the liver, an event which invariably proves fatal, if it communicates with the peritoneal cavity.

2. The experiments made upon dead bodies are, in our opinion, not better calculated to solve the problem in question. First of all, with what show of reason can the causes of certain phenomena, observed in inanimate subjects, be applied to the living bodies? and what shall we think, in the next place, of the concurrence of the causes which simultaneously change the structure of the liver and brain, while in many instances, on the occasion of violent falls, which were sooner or later followed by the death of the individuals who had sustained them, we found on dissection, the cranium and the extremities fractured, whilst the liver had remained unchanged? We shall give a brief account of three cases which will prove, I trust, in opposition to the opinion held by the advocates of the theory of mechanical causes of abscesses of the liver, that it is exceedingly difficult for this organ to become disorganised from a fall or concussion, especially if the weight of the body should not directly and powerfully bear upon it; and then this latter circumstance is of such rare occurrence that I have met with but one instance.

*First Observation.*—A young chasseur of the ex-guards, a patient of the hospital of Gros Caillou, in a fit of delirium, jumped from a window of the second floor, and fell upon the pavement in the yard: he was instantly carried into the ward of the wounded, where, a few hours afterwards, he expired. We carefully opened his body in order to observe the derangement which we believed to exist in the liver. We noticed, 1st, a well marked diastasis of the parietal bones, between themselves and between the os frontis: 2dly, at the occipital bone, which had not been at all displaced, there was a fracture

with splinters, the rays of which extended and diverged towards the base of the cranium; the dura mater was in several places detached from the roof of the cranium, the brain was sunk down and gorged with blood, and the ventricles were filled with a large quantity of the same fluid: 3dly, there was a luxation of the right arm, combined with shattering of the elbow of the same side; the left thigh bone was broken, and the sixth and seventh vertebræ were fractured.

On opening the abdomen we were astonished to find the liver and other viscera unchanged; the intestines were merely distended with gas. A small quantity of blood had been effused into the right cavity of the thorax, which arose from the vena azygos having been ruptured. The lungs and the heart exhibited nothing remarkable.

*Second Observation.*—Peter Gérard, superintendent of the kitchen of the hospital of Gros Caillou, returned home in a state of intoxication, in the night of the 4th to the 5th September 1815. Being very warm, he seated himself upon the window-frame of his chamber, with the back turned towards the yard. In this position he fell asleep, and inclining involuntarily backwards, he tumbled head over heels out of the window. Upon the noise of his fall, people came to his assistance, and found him stretched out in a state of perfect immobility, and almost deprived of life.

The two lower extremities were shattered, and the right, in particular, was entirely disorganized. A superficial and contused wound was, moreover, observed on the right temple, without fracture of the cranium, besides which there were several violent contusions on different parts of the body. Notwithstanding the extreme exhaustion of the patient, occasioned by a profuse hemorrhage from the anterior tibial artery, we deemed it indispensable to fulfil the urgent indication of amputating the disorganized leg. We performed this operation close to the knee through the substance of the head of the tibia. The other leg, though it had been shattered likewise, yet countenanced some hope of its being preserved, and was put accordingly into a suitable apparatus. Embrocations

with hot and camphorated brandy were applied over the entire surface of the body and a rigid diet was prescribed.

The first three or four days were passed in a state of great perturbation; but, after the seventh, these alarming symptoms subsided, which, by defeating our measures, had till then deprived us of the hope of preserving the life of the patient. The suppuration of the stump being established, had become copious, and in a few days more the wound was cleansed. A traumatic fever broke out and might have been regarded as a favourable symptom; the patient improved visibly, and he was in a situation the most auspicious for his recovery, when, in the night of the 17th September he was overtaken by death, after having conversed for a considerable time with the nurse of the ward. During the whole time of his illness, he had continually suffered from pain in the epigastrium, attended by a sensation of heaviness and weakness. We had scarified cups and blisters applied over this region.

On inspecting the body after death, we found the abdomen tense and meteorised; the stomach and the intestines were discolored and distended with gas; the mucous membrane of the stomach displayed in various places of its surface the signs of a phlogose condition. The liver and the other viscera of the abdomen were in their natural state; the lungs presented nothing particular. The ventricles of the heart contained some albuminous concretions of a yellowish aspect. The arterial system was filled with gas, and the veins contained very little black and coagulated blood. The blood vessels of the brain were slightly engorged. Upon this organ, at the spot which corresponded with the contusion of the temple, there was an ecchymosis which extended over a large portion of the middle lobe of the hemisphere.

The causes of death may in reality be referred to the concussion of the brain, to the almost sudden atony of the intestines, to the sinking of the nervous system, and to the hemorrhage which took place immediately after the fall.

*Third Observation.*—This case, even more than the preceding, will confirm the views which we have suggested in order

to prove that abscesses of the liver, of which we speak at present, are by no means the consequences of mechanical causes.

Frederic Habrer, a soldier of the train of the fourth regiment of cuirassiers of the guards, aged 34, of a robust constitution, had been engaged upon a cart loaded with hay, in tightening the rope which was to press down and keep this quantity of forage together, when he was suddenly lifted up by an unexpected jerk of the rope, after it had become unhooked from the beam, the cross piece of which had slipped out of the hands of his assistant: having been tossed at first several feet above the pile of hay, he was next thrown upon the pavement of the street, where he remained for a few moments without exhibiting the slightest signs of life. He was lying on the right side, bathed in blood, urine and stercoreaceous matter, the result of the hemorrhage from the nose and ears, as well as of the precipitate and involuntary discharge of urine and feculent matter.

On his arrival at the hospital of Gros Caillou, October 5th, 1816, at 7 o'clock, A.M., he was pale, disfigured, drowsy and in a sinking and generally paralytic state; the whole right side of the face was ecchymosed and the cheek considerably swollen; his nose was driven in, and there was a transverse wound above the right eye-brow, combined with a radiated fracture of the frontal bone, prodigious swelling of the eye-lids and total occlusion of the eye; the shoulder, the arm, the elbow, the back, and particularly the haunch of the same side, were ecchymosed and excoriated. At times he was out of his senses, and trembled in every limb; he had scarcely any pulse, and to the questions put to him he could make no answer; in short, I believed him to be in the utmost danger. Warmth of the body being restored, his head was shaved and covered with compresses, soaked in very hot and camphorated vinegar. I ordered sinapisms to the feet and prescribed an antispasmodic draught for the night.

Symptoms of inflammation of the injured parts and of the cerebral membranes having supervened on the next day, I freely dilated the wound and exposed the fracture, which, like the fragment of a star, divided the external wall of the right frontal sinus. Some nervous branches which had been lacerated by

the offending cause, were included in my incisions, without any untoward symptoms resulting from it; but, I studiously abstained from rasping the bone, as is recommended by authors for the removal of the pericranium, seeing beforehand that the trephine would not be necessary, as no bony fragments were sunk inwards. The wound was simply dressed, and the patient put upon the use of diluents, purgative enemata and embrocations of camphorated brandy over all the ecchymosed parts. It became necessary for several days unrelentingly to persevere with the most powerful antiphlogistic measures, in order to appease the pain and inflammation which returned upon the slightest causes.

The system was tranquillized at last, and the patient, who, until the eighth day had vegetated in a state of stupor and nonentity of his sensitive functions, resumed the use of them and asked himself for every thing he stood in need of. Suppuration became established and abundant; several small abscesses, having been formed successively in the substance of the eyelids of the right eye and at the root of the nose, were opened. On the thirteenth day, the patient was in the most satisfactory condition, when all at once symptoms of adynamia made their appearance, accompanied by stupor and a well marked gastric derangement. Suppuration had not been at all diminished, but it bore a greyish aspect, and the wound presented an ugly appearance. I hastened to give him an emetic, composed of 25 grains of ipecacuanha and one grain of tartarized antimony: this produced copious evacuations, both upwards and downwards, succeeded by abundant perspiration and perfect tranquillity. The patient, however, remained still in a state of almost habitual somnolency, and complained always of pain in the head. As there existed no other symptom of paralysis in the extremities, or of effusion beneath the cranium, I refused to apply the trephine, however much the physicians who had seen the patient believed it to have been indicated. I directed the region of the head, where the wound was situated, to be covered by a large blister, and prescribed for the next day a decoction of calisaya bark. Broths, good wine and the aromatic embrocations were continued. All the symptoms dis-

persed rapidly, the patient continued improving, the functions of his senses and organs were restored; several small fragments of bone, belonging to the nose and external wall of the frontal sinus exfoliated; the wounds cicatrized; the sight of the right eye had not been impaired; and he was altogether in a proper condition to leave the hospital in the early part of December of the same year. This fact is another proof that the tréphine is not necessary, except in those cases which we have pointed out.

If, as has been alleged, the liver, in consequence of a violent fall, were susceptible of being lacerated or changed so as to produce inflammation or immense abscesses, the individuals who were the subjects of the preceding observations, ought to have exhibited these changes of structure in the highest degree; and yet we meet with them frequently supervening on trifling injuries of the head without fracture, and without the patient's having sustained a fall or concussion violent enough to react upon the hepatic system.

The weight, the organisation of this viscus and the situation it occupies in the abdominal cavity, have been ingeniously called into aid to support the hypothesis of structural changes so gratuitously ascribed to it; nature, in this respect, has been charged with neglect; but as regards this and every other organ of the animal economy, she has, on the contrary, so well arranged her measures and precautions, that save by any direct and truly destructive agency, the liver no more than any other viscus is susceptible of being detached, of breaking or becoming changed by the operation of a fall or any other indirect shock. Whatever may be in other respects the condition of the stomach, yet it would never involve the loss of the equilibrium of the individual, and it would be easy to prove the truth of this assertion, if daily experience did not dispense us so to do. I have made some analogous observations at the instance of the spontaneous rupture of arteries, to which it has been suggested to refer the essential cause of aneurisms, of such even as are situated internally.

But it is time that we ourselves should endeavour to solve the problem under discussion, and to point out the causes of

the formation of abscesses of the liver subsequently to injuries of the head. Some recent writers, Desault in particular, have vaguely hinted these causes, without developing them.

We have had occasion for some time past to observe that the functions of the pulmonary and biliary apparatus were disturbed and sensibly acted upon by the phlegmasiae of the fibrous membranes of the head or extremities, especially of those which correspond with the organs situated alongside of them. It would appear that any irritation set up in some portion of the fibrous membranes spreads rapidly and sympathetically towards the centre of the viscera which receive their stimulus from the nerves of function; the liver, as the most complicated organ, where the capillary circulation is the least active, and where the fibrillæ of the intercostal nerve are more numerous, appears to be pre-eminently susceptible of the effects of this sympathetic irritation. The vital properties are soon disordered; inflammation becomes established with more or less promptness and intensity; an abscess is formed and travels through its different stages. These abscesses, when once formed, contribute doubtless towards the death of the patient, and would in themselves be capable of destroying him sooner or later, even if he should resist the consequences of the primary or traumatic inflammation. But it is by no means so uniformly after injuries of the head that these derangements of the hepatic system are more particularly observed; for, we have also seen many persons with injuries of the ginglymoid articulations of the upper or lower extremities perish of abscesses of the liver which had been developed probably since the injury of the parts affected. This organ, moreover, is not the only viscus liable to be attacked at the instance of injuries of the head or of other parts of the body; by virtue of the reasons which we have assigned above, every other organ, be it of the chest or of the abdomen, is subject to the irritation arising from the injury, and may separately present derangements analogous to it.

It is possible also that the fluids, which, being more or less heterogeneous in their character, exude from the wound, may be transmitted to the liver by the cellular tissue, particularly if the wounds should be irritated by too frequent and careless dress-

ings, and if the sudden suppression of the cutaneous perspiration, that of the alvine discharges and a morbid susceptibility of the hepatic system should become associated with the traumatic causes just enumerated. We shall now proceed to relate some cases which doubtless will be sufficient to settle the opinion of practitioners on the subject.

*First Observation.*—One of the Prussian soldiers of whom we had charge at the hospital of Gros Caillou, during the month of June 1814, had, ever since the battle of Paris, two fistulous sores at the middle of the right arm, combined with loss of substance of the humerus and a false articulation. The two fragments appeared to have been rounded off at their articulating surfaces, so as to ride with facility upon each other; the limb, in other respects, was sound and the subject himself in pretty good condition. In order to accomplish the re-union of the fragments, the seton has been applied to this false articulation, a remedy which has been devised by the English,\* and recommended by some French physicians. (See the “*Dissertation de M. le docteur Laroche, No. 428, in 4to.*”). A strip of fringed lint had been in consequence passed, with the aid of a seton needle, betwixt the two bony fragments.

Symptoms of inflammation exhibited themselves before the expiration of the fifth day, and were rapidly developed. The two bony extremities and the surrounding soft parts swelled to such a degree that the engorgement spread as far as the shoulder and fingers. To these local symptoms were super-added violent pains in the right hypochondrium, difficulty of respiration, oppression, and a high traumatic fever. Seeing the patient in this condition, the first thing we did was to withdraw the seton, and to direct the application of emollients to the affected limb and of two scarified cups to the hypochon-

\* The claims of the venerable Coryphaeus of American surgery, Dr Physick of Philadelphia, to the originality and ingenuity of the application of the seton needle in cases of disunited fractures of long standing, are so fully admitted at home and abroad, that the bare mentioning of the fact would be an act of supererogation, were it not for the vagueness of the term “English” used in the original text, so as to merge American merit in the general vortex of the English practice. *Suum cuique!—Trans.*

drium, and afterwards to prescribe refrigerants and antispasmodics; but these measures were useless; the symptoms increased, gangrene made its appearance in both wounds of the arm which had attained an enormous size, while the patient felt at the same time lancinating pains in the region of the liver. A few days later, we perceived on the edge of the false ribs a protruding and fluctuating tumour, presenting all the symptoms of an abscess of the liver. His feeble and wasted frame would not permit us to employ any of the remedies which were indicated for the disease of the arm and liver; he died in fact twenty-four hours afterwards.

On dissecting the arm the next day, we discovered a deep seated and extensive inflammation of the membranes of the bony fragments on which it had settled. Sinuses extended as far as the arm-pit and under the pectoral muscles. There was an enormous abscess within the substance and in the centre of the large lobe of liver, almost ready to burst into the cavity of the abdomen.

It is very certain that these abscesses were the results of the irritation and inflammation of the arm, because, until then the patient had not complained of any indisposition which could have induced us to suspect the slightest structural change of the liver.

(The three next observations refer to three soldiers of the ex-guards who, in 1811, were in succession brought to the hospital of Gros Caillou on account of sabre wounds which they had received in duels.)

*Second Observation.*—In the case of a young chasseur, a sabre cut had, besides the integuments, carried away a piece of bone, of an oval shape and about one inch and a half in length, belonging to the external table and diploë of the middle portion of the right parietal bone. The injury had been treated as a simple incised wound and covered merely by a fold of linen, soaked in hot and honeyed wine, and kept in its place by compresses and a suitable bandage. The patient was restricted to a cooling regimen. The ten first days were passed without any unpleasant symptom; on the eleventh, the suppuration dried up and the edges of the wound turned red and inflamed; he

had fever, combined with cephalalgia, tinkling of the ears, delirium, burning thirst, deep seated pain and oppression in the right hypochondrium. We directed leeches to be applied to the periphery of the wound, scarified cups to the temples and hypochondrium, an emollient cataplasm to the head; besides which pediluvia, injections and diluents were successively employed. In spite of all these measures, inflammation went on rapidly increasing, the pain in the side became lancinating and steady; the patient soon after had rigors and cold sweats preceding the accession of a fever of a dangerous type; he died, at length, in the night of the thirtieth to the thirty-first day after receiving the wound.

We found, upon opening the corpse, the pericranium in such a state of inflammation that its blood vessels might be said to have been injected with some fine fluid. That part of the dura mater which corresponded with the wound internally, was red and tumeified; the brain was diseased nowhere, nor was there any serum in the ventricles. A very considerable quantity of purulent matter, proceeding from the bursting of an enormous abscess of the convex part of the liver, had discharged itself into the abdominal cavity. The purulent nidus extended far into the substance proper of the liver. The proximate cause of the death of this subject may be referred to his twofold disease, but especially to that of the liver.

*Third Observation.*—A dragoon of the guards had received a sabre wound on the head which had taken off a part of the integuments and a pretty thick lamina of the right lateral part of the occipital bone. The injury not seeming to be of any great account, he had been accommodated in the convalescent ward, and given in charge to the surgeon of the ward. A simple dressing was applied. He passed the first two weeks without any remarkable occurrence; the wound was in very good condition, and had begun to cicatrize from its circumference, when all at once symptoms of inflammation supervened and the right hypochondrium became painful. To these there was at first no attention paid, and they became, therefore, so rapidly developed that the fever and the inflammation of the edges attained their highest degree. The pain in the side

also became more intense and pulsating. No disturbance in the functions of the brain was perceptible, nor was there any symptom of effusion.

Such was the condition of this man, when we were called to see him: local depletion, refrigerants, pediluvia and antispasmodics produced merely a momentary and but slight relief, and the patient died on the thirty-seventh day after admission into the hospital.

In the progress of the autopsical examination we discovered, 1st, a violent inflammation of the pericranium; the part of bone originally cut into and the corresponding portion of the dura mater participating in this inflammation; 2d, a pretty extensive abscess on the concave surface of the liver, part of its purulent matter having discharged itself already into the abdominal cavity.

*Fourth Observation.*—A grenadier had received a longitudinal wound on the right lateral region of the forehead, in consequence of a sabre cut which had divided the external table of the frontal bone as far as its diploë. He displayed at first some symptoms of concussion; still he did not fall down immediately, nor did he lose his consciousness till several moments afterwards. The first six days passed off without any further accident; but about that time he complained of some acute and steady pain near the bottom of the wound, which had suddenly ceased suppurating. There was somnolency interrupted by convulsive movements and slight fits of delirium; whilst at the same time he experienced an oppression and a dull and constant pain in the right hypochondrium. Local depletion, mucilaginous diluents, and emollient applications externally reduced the inflammation; but, independent of the symptoms already enumerated, those of compression now manifested themselves; the patient had lost the use of the left arm, while the leg of the same side was in a state of almost continued mobility. Although he suffered the most excruciating pains from his wound, yet he would always lie on that side. These symptoms induced us to apply the crown of a trephine to the most oblique point of the fracture. The opening being made, there issued from it a common table-spoonful

of purulent matter, mixed up with small clots of grumous blood, which had been lodged between the cranium and the dura mater, which latter it depressed to the extent of about four lines in depth.

In order to act upon the affection of the liver, which was distinguished sufficiently by the preternatural protrusion of the right hypochondrium, by the pulsating pains, the irregular rigors and the frequent inclination to vomit, we directed a blister, besprinkled with cantharides and camphor, to be laid over the region of that organ. The patient was instantaneously relieved; but this tranquillity was not of long duration, for it was soon succeeded by well marked symptoms of adynamia, as cold sweats, small pulse, colliquative diarrhoea, tumefaction of the abdomen, difficulty of breathing and gangrene of the wound. Death followed close upon this gloomy catastrophe, and again enabled me to confirm my opinion on the cause of abscesses of the liver, supervening upon injuries of the head without any previous fall or other violent concussion. In fact we found, on opening the abdomen, a collection of purulent matter above the transverse mesocolon, which proceeded from an enormous abscess situated in the substance of the great lobe of the liver, very near the suspensory ligament. On inspecting the cranium, we discovered also, independent of the purulent deposition of the dura mater, a phlogose condition of this membrane, and a suppurated spot in that part of the brain which corresponded with the latter.

We deem it necessary to observe that none of these patients had fallen at the very moment of the accident, or that they had been bled from the foot; the three last, according to their own statement, enjoyed, moreover, perfect health previously to the occurrence of their misfortune. Doctor Aumont, one of the principal medical assistants of the hospital, opened the bodies of the two last subjects. They are not the only ones which we possess on the subject under discussion, but we have thought proper to limit ourselves to those of which we have given an account.

Now, in order to resume what we have said, concerning the causes of abscesses of the liver, supervening upon injuries of the head, we arrive at the conclusion:

1. That these abscesses but very rarely recognize for their essential cause a direct and violent shock or pressure of the liver, caused by the fall of the individual, or by any other contounding body which may have struck the right hypochondrium.\*

2. That the causes of these abscesses after injuries of the head ought to be referred to the sympathetic irritation, communicated to this organ by the inflammation established in the fibrous membranes of the cranium or of the bones of the superior or inferior extremities, particularly of the same side, and to the ichorous miasmata, or to some fluid more or less acrimonious and subtle, conveyed to this organ by metastasis.

3. That to all appearances any communication of the morbific principles of the affected parts with the liver is more readily accomplished, if they shall not have to pass the median line of the body.

The arguments, and the facts by which we have supported them, would seem to reduce the important question which we have discussed; and we believe to have, at least, traced the road to be pursued by practitioners who are desirous to test the principles best suited to settle this point.

### *Of Apoplexy.*

We deem it right to combine with the account just given of the traumatic lesions of the encephalon, a very succinct view of the sanguineous and serous congestions which are apt to occur in the ventricles of the brain, underneath the cerebellum, in the direction of the medulla oblongata and within the membranes of the spinal marrow.

If these congestions are developed to such an extent that they impair the sensibility, the muscular contractility, and the integrity of the sensitive and intellectual functions of the patient, they constitute what is termed apoplexy, which may be distinguished in serous apoplexy and sanguineous apoplexy.

Serous congestions, though rather rare, consist in an abnor-

\* If it should happen perchance that in the fall of an individual the whole weight of the body bears upon the right hypochondrium, the liver may sustain some alteration, be lacerated perhaps; but then such alteration would be independent altogether of the injuries of the head, as we have demonstrated.

mal and more or less considerable accumulation of the cerebro-spinal fluid which circulates in the cavities of the encephalon, in an undulating manner, as circumstances may be; that is to say, it may pass from the lateral, the third and fourth ventricles into the spinal canal, and *vice versa*, by circulating in these cavities between the pia-mater and the arachnoid membrane. This fact was perfectly well known to the older physicians. The fluid accumulated in these cavities, forms in children congenital hydrocephalus, which is sometimes accompanied by *spina bifida*. The patient may survive the gradual development of this species of dropsy, particularly if it has been developed previously to the complete ossification of the bones of the cranium. If, however, the serous collection occurs suddenly in the ventricles of persons whose fontanelles have become obliterated, its consequences are then more disastrous, and if it have arrived at a very high degree of intensity, it is designated by the name of hydrocephalitis or serous apoplexy. A collection of pus, formed in some point of the encephalon, may give rise to the same phenomena and be attended by the same results. In all cases it is easy to distinguish this congestion from the sanguineous congestion by the preceding events and by the symptoms which are its peculiar characteristics; these are discoloration of the skin, wanness of countenance, pallor of the lips and tongue, small and languid pulse, heaviness of the head, abnormal dilatation of the pupils, paralysis, in various degrees, of the inferior extremities or of one half of the body, and if the collection be confined to the cavities of one side only of the brain, restraint and slowness of the functions of respiration and digestion. If such patients incline the head forward, they are apt to lose their balance, and faint; the sensitive and intellectual functions are usually impaired in proportion as to the effect of the unequal compression which the accumulated serum produces upon the origin of the nerves.

Sanguineous depletion is not indicated under such circumstances, but there is the most urgent necessity for the application of revulsives to the base of the cranium and of derivatives to the lower extremities, and for inducing emesis, if the stomach should be overloaded with alimentary matter, not indeed by

means of emetics, for they would not operate on the stomach, paralysed as its powers are from the want of stimulus which the pneumo-gastric nerve is incapable of transmitting or transmits only imperfectly, but by mechanical irritation excited by the introduction into the gullet, or entrance of the pharynx, of the feathers of a goose or swan's quill. This remark is of the greater importance, as those emetics which have not acted upon the stomach, may give rise to the subsequent development of a proportionate inflammation of the mucous membrane of the intestines, whereby sometimes the success of such other remedies might be defeated as could have been advantageously employed for the purpose of removing the congestion of the brain.

The diagnosis of sanguineous apoplexy may be assisted independently of the knowledge of the idiosyncrasy of the patient, and of all that may have preceded the accident, by the injected condition of the vessels of the conjunctiva, the redness of the face, turgidity of the veins of the head and neck, by the tendency of the former to sink upon the chest, the thickness and redness of the tongue, if it be visible at all, by the fulness, the tension and slowness of the pulse, or the pulsations of the arteries, the more or less extensive malformation of the neck and the general repletion of the patient. As to the colour of the face, particular care should be taken not to be deceived by it; for it frequently happens that the face is discoloured, although the congestion be of a sanguineous nature. This occurs, for instance, when it suddenly takes place, and when the effects of the deep seated compression have almost simultaneously suspended the action of the heart, so that the cutaneous capillaries of the face could not be injected by the contraction of its ventricles. Of this we have seen a great many examples, while the other symptoms may always be satisfactorily traced by the eyes of the anatomical physician.

Supposing, then, we have formed a correct prognosis, it is urgently required to unload the vessels of the head, and the most efficacious depletion that, under such circumstances, can be made, is to open the jugular vein. The reasons for it will be explained in the proper article concerning this species of

bleeding, which may be succeeded by scarified cups placed over the nape of the neck, along both sides of the spine, and over the dorsal regions. Some should be applied also over the epigastric and hypochondriac regions, for the purpose of emptying the vessels of the stomach and of the lungs, and of rallying the vital properties of these organs. After these depletions, ice is to be placed upon the head, in order to condense the fluids circulating in the vessels of the brain, and to promote the re-absorption of those which constituted the congestion. Derivative applications to the legs or soles of the feet, may be resorted to at the same time; such as sinapisms or pediluvia of salt-water. Internally I administer nothing but mucilaginous diluentsslightly acidulated, and gently stimulating injections, such as soap-water. Tobacco clysters, as recommended by some writers, are injurious, inasmuch as they blunt the sensibility of the mucous membrane of the large intestine, after having produced previously a sudden excitement, which effect spreads over the whole system of the nerves of relation. Thus a spark of vitality is not seldom extinguished when, on the contrary, it ought to have been kindled into action by the remedies above indicated, with which should be combined, moreover, exposure to the fresh air, dry cups, frictions over the entire surface of the body, and the use of alkaline liniments, strengthened by the addition of tincture of cantharides. As soon as the turgescence is completely removed, moxas may be put at the base of the cranium, and over both sides of the vertebral column, the employment of which may be persevered in, taking care, however, to observe the necessary precautions. By this treatment, we may fairly assert to have saved the lives of a great many individuals. Our venerable friend, Professor Chaussier, is a remarkable instance of it. It was to the application of a pretty considerable number of moxas, which I, under the eyes of his own physician, M. Ribes, put one after another to the base of the cranium, that this illustrious physiologist, at the time of his first attack, was indebted for the almost complete restoration of the vital properties to his paralysed extremities.

In order to overcome the paralysis resulting from this kind

of apoplexy, the application of the moxa must be repeated over the origin of the paralysed nerves, or against the sides of the base of the brain subject to the congestion.

Surely, the use of the hot springs, or the establishment of issues could never compare with the topical revulsive on which we have dwelled. The hot springs have the great inconvenience of irritating all the different systems, and of rarifying the fluids which circulate in the vessels of the head, so as to produce consequently a new congestion. The artificial drains operate in no way upon the diseased organs, and exhaust the strength of the patient by the copious suppuration to which they give rise. Internally, we must, as in serous apoplexy, confide alone in the use of mucilaginous diluents and honeyed acidulated drinks.

Purgatives are rarely indicated.

The resolution or absorption of the fluids which had caused the distention of the parietes of the ventricles of the brain, the cerebral substance itself, and the bones of the cranium, so far as they are susceptible (which occurs occasionally in young subjects), is attended afterwards by the approximation of these parietes, by the condensation of the pulpos texture of the encephalon, and by the successive and gradual reduction of the cavity of the cranium, the invariable tendency of which is to be in proportion to the periphery of the brain. It is difficult to account for the modus operandi of the causes which produce this phenomenon; but we are convinced that this reduction in young persons, is caused by the re-absorption of the congested fluid of which we have spoken, as it takes place also in old people. A similar reduction partially occurs also in those individuals who have been trepanned, or who have sustained a loss, more or less considerable, of the bones of the cranium. We have had repeated opportunities to verify this fact in several subjects.

#### *Injuries of the Cerebellum in Man.*

We propose, in the present article, to describe the phenomena which we have observed in several individuals, who had been affected with organic lesions of the cerebellum, and we are inclined to believe that the result of our observations

will go far to prove that this portion of the encephalon is by no means so essential to the functions of locomotion of the individual as certain physiologists have imagined, but that, on the contrary, it appears to exert a very marked vital influence upon the organs of generation, as Doctor Gall has already suggested.

Experience has already made us familiar with the fact that acute inflammation of the cerebellum, be it the result of a spontaneous development, or the effect of some mechanical cause, was constantly attended by an exalted state of the animal and organic sensibility, without the slightest disturbance supervening in the intellectual functions of the patient. If the injury be confined to one only of the lobes of the cerebellum, the increase of sensibility will be perceived on the side affected, and be accompanied, in various gradations, by acute pain at the occiput, by horripilations, by gradual or convulsive contraction of the muscles of the face, and of the upper and lower extremities of the same side, together with a sort of painful formication in the fingers and toes. Vision is frequently disturbed by electric flashes of various colours, and the patient grows irascible. The horizontal and reclining position is the most agreeable to him; too forcible extension or too long maintained elevation of the trunk incommodes him greatly, gives rise to convulsions, and not seldom to alarming syncope. We have observed that the effects of this vitiated sensibility show themselves more particularly in the posterior region of the patient than in the anterior. (Thus, in traumatic tetanus, we have remarked, that those injuries which were situated any where in front of the body, caused emprosthotonus, while those situated posteriorly, were invariably followed by opisthotonus.) With these particular symptoms associate themselves those which are common to the inflammation of other organs. We shall at the end of this article, relate several cases which, as it appears to us, will corroborate all these assertions.

If the inflammation terminates by suppuration, it is generally established beneath the internal surface of the pia mater, the arachnoid loses its transparent appearance, and becomes thickened like coagulated albumen, still there is no red vessel to be

seen in its thickness, nor have we ever been able to discover a single one; the purulent focus afterwards extends and penetrates sometimes into the substance proper of the cerebellum, so as to consume the cortical, and gradually also the medullary matter of the arbor vitae. A continued febrile excitement, with slight intermissions, a dull and fixed pain at the occiput, with a sense of weight in the head, which the patient seeks to repose, on the injured side, upon the pillow of his bed; the loss of hearing of the same side; the failure of speech, or difficulty of pronunciation; and, finally, the consciousness of the cause from which the abscess has resulted, are so many symptoms by which this morbid condition is characterized: there is, however, one circumstance deserving to be noticed, namely, that during the existence of such abscesses, whose career we have watched in the subjects of the subjoined observations, we have never witnessed on one side, more than on the other, any particular symptom of a sensible change in the muscular contractility, or in the animal sensibility. This is the more remarkable, as in other persons who had received wounds on the occipital region, combined with injury of the cranium, and effusion underneath the tentorium of the cerebellum, exerting thus mechanical pressure upon one of its lobes, we have observed that the upper arm of the same side, evidently had become paralysed. There can be no doubt, that the consequences of such pressure bear upon the origin of those nerves, arising from the medulla oblongata, which are the most in contact with the fluid or substance causing the pressure; of this class are in particular the hypoglossal nerves.

When the paralysis has attained a very high degree, it invariably settles upon the parts of the affected side, which may be explained by reference to the anatomical relations of the cerebellum and its medullary productions, which display no decussation or other interlacing whatever; we possess, in this respect, a great many examples which undeniably prove the correctness of these facts.

If the cause which alters the substance of the cerebellum, exerts no mechanical pressure upon the origin of the hindmost nerves of the medulla oblongata, there will be no paralysis,

and the genital organs alone seem to bear the effects of this morbific affection. During the first stage of inflammation, the animal and organic sensibility is increased, then blunted, and at last gradually extinguished. The same holds with the powers of motion, which exhibit at first an abnormal and occasionally tetanic contractility, combined with swelling; next a falling away and contraction of the motor fibre; and finally are attacked with atrophy, after which the disease extends to the spinal marrow, through the fluid there effused, which previously compressed the medulla oblongata.\*

These symptoms are subsequently joined by a troublesome dyspnœa, together with engorgement of the organic vessels of the lungs, but very frequently a more or less severe attack of hemoptysis supervenes, and continues in spite of all the remedies which are indicated and employed with the utmost care, until the causes of compression are removed by absorption. It would seem in this case, that the lungs are deprived of the stimulus requisite for the performance of the functions of respiration. If resolution takes place spontaneously, or in consequence of the operation of topical revulsives, seasonably applied, as near as can be, to the seat of the effusion, and if the patient recovers, which is a very rare occurrence, he will commonly be subjected to some remarkable infirmities, such as a feeling of excessive tenderness in the neck and occipital region, a decided asthenia of the genital organs, combined with atrophy of the testicle of the side which corresponds to the diseased lobe of the cerebellum, or of both, if the whole of this part of the encephalon be affected. In the case of Raymond which has been related elsewhere (see p. 134), we have a striking proof of the truth of this last assertion.

The organs of generation in their turn, likewise, appear to exercise a marked influence upon the cerebellum; for when they have been removed by disease or some other cause, the occipital region of the cranium and cerebellum gradually un-

\* Concerning the arrangement and communication of the ventricles of the brain with the spinal marrow, see the great work of Wenzel, "Structura cerebri hominis et brutorum."

dergoes a reduction so sensible that the occipital protuberances, more or less prominent before the accident or disease which beset the genital organs, disappear, and the whole occipital region of the head is reduced in proportion. We have verified this alteration by reduction in a great many soldiers who, at periods more or less advanced, had been operated upon for saccocoele. When the person had lost only one of the genital organs, the decline of the cerebellum and of the occipital protuberance which corresponds with the lobe of the cerebellum, will be confined to the side of the extirpated organ. (Compare with these remarks the article on "the Diseases and Injuries of the Genital Organs," in the *Clinique Chirurgicale*, Vol. III.)

*Treatment.* The affections of the cerebellum, occasioned by external mechanical causes, ought to be treated with the utmost attention. The first indications in this respect to be fulfilled, are to dilate the wound of the external soft parts, if there be one; to extract the foreign bodies or portions of bone denuded of pericranium, if any such should be encountered; to approximate the edges of the wound by means of a piece of perforated linen, thinly spread with some tenacious and balsamic substance, and to apply over it a simple dressing, such as the bandage of Galen. If, after the first dressing, symptoms of sanguineous plethora make their appearance, general and topical bleeding, from the temporal artery and the veins of the extremities, as well as by scarified cups to the neck and between the shoulders, must be had recourse to. These measures, which ought to be repeated *pro re nata*, may be followed up by mustard pediluvia, by the application of ice upon the head, and the exhibition of cooling and mucilaginous drinks.

The hydrocyanic acid, so much extolled latterly in all inflammations of the head, we have ourselves tried in every way; but it has constantly appeared to us to have been injurious; for, when given in the smallest dose, it sometimes produces colic and bloody discharges. This was more particularly observed by us in the case of Raymond.

*Observations.* In order to support our remarks on the various affections of the cerebellum described by us, we now propose to relate several cases which we have collected.

One of the most curious cases of inflammation of the cerebellum, is that of a soldier of the army of Egypt, eighteen years old, who, at the moment when the vessel, in entering the harbour of Alexandria, fired a salute, was struck by a splinter of wood on the neck, from which resulted a violent contusion, with ecchymosis of the whole occipital region. He was carried to the ambulance in that city, where he remained seventy-five days. This man instantly displayed the symptoms of intense inflammation everywhere beneath the parts affected, but, above all, in the cerebellum. The pain in the occiput, which was excessive, did not abate till an abscess at the neck opened spontaneously. The patient, whose life had been in danger, told us, that during the treatment of his disease, and long after his recovery, he could not move the head, and that he felt an extreme tenderness throughout the whole cervical region, so as to unfit him to bear the slightest touch upon it. The inflammation yielded, however, to repeated bleedings, to ablutions of the head with cold water, and to cooling and diluent drinks; he finally recovered, and three months after the occurrence of the accident, he rejoined his half-brigade at Cairo, in which he continued to serve till his return to France with the remainder of our expedition. Several years having elapsed, when this soldier came before the Board of Health of the hospital of Gros Caillou in order to solicit his discharge, we mistook him, at first, for a young conscript, who had been exhausted by some asthenic disease; he was then thirty-two years old, of middle size, thin and emaciated; he looked pale and somewhat wrinkled, his eyes were depressed, the lips blanched; his hair scanty and bristled, particularly that covering the occipital region, where he continually felt a sensation of pain and habitual coldness; yet his mental faculties had never sustained the slightest alteration. He was beardless, and his voice was shrill and feminine. Some of the assistants, at first, suspected a woman to have served in the dress of a soldier, of which there are so many examples on record. By a more minute examination, we were enabled to verify his sex, and to our great surprise, we found his genital organs reduced to the size of those of an infant some months old, his

penis measured five or six lines at most, by two or three in diameter, and never experienced the least erection; his testicles were almost gone, and wasted to such a degree, as scarcely to equal in size a small kidney-bean.

This individual who at the time of his discharge, in 1810, was introduced to Doctor Gall, declared that ever since he had met with this accident, he had lost every kind of sexual desire and erection, and that his beard, which previously had been thick, had disappeared by degrees. He, like all young fellows of his age, had also previously enjoyed the powers of virility.

Another not less curious instance was furnished us, in the person of the Sieur François Auguste, quarter-master to the horse artillery of the ex-guards, who, during the action of Benevent in Spain, in 1809, had been struck by the ball of a blunderbuss, which crossed from one side to the other the extensor muscles of the head, by grazing the occipital protuberances, which, being remarkably prominent in this subject, were thereby deprived of their aponeurotic adhesions. The two openings made by the ball were dilated, which enabled us to pull out part of his shirt collar which had remained behind in the track of the projectile. The dressing of these wounds was made as the nature of the circumstances required.

The patient immediately felt a violent pain in his occiput, and a sense of weight of the whole head, together with numbness of the lower extremities. His vision and hearing were so much impaired that he could hardly discern any large objects or understand the most piercing sounds. His testicles became reduced, and wasted away; his penis diminished in the same proportion and remained motionless. The local symptoms were dispersed, and the patient was restored to health before the expiration of the fiftieth day.

The subject of the third observation was a man of the name of René Bigot, a chasseur of the horse guards, of a robust constitution and passionately fond of women. In the same action of Benevent he had received a sabre-wound which had divided the whole projecting or convex part of the occipital bone as far as the dura mater, a small portion of which had been cut into. The right lobe of the cerebellum could be seen through

the opening into this membrane. The slightest touch of this organ gave rise to vertigo, syncope and convulsions, without the patient evincing the least sign of pain. Before dressing the wound, we took the precaution to make an incision at the base of the flap in order to facilitate the discharge of the fluids. That part of it which corresponded with the opening into the meningeal covering, formed no adhesion, because of the incessant oozing from the internal surface of that serous membrane; otherwise there was no further effusion. These fluids escaped at every dressing in small bubbles, and produced a faint whizzing noise, which we attributed to the external air passing in and out through the same opening. After the first few days the patient lost the faculty of vision and hearing of the right (or affected) side; at the same time he suffered violent pain along the course of the spine, and a kind of formication in the testicles, the size of which most rapidly decreased; for, in less than a fortnight, the right testicle, in particular, was reduced to the size of a small Windsor bean, and he soon lost even the thoughts and the recollection of the pleasures which he had enjoyed with so many women.

The journey from Benevent to Valladolid he had borne very well. His wound was in every other way in the best possible condition, and with the exception of the functions of vision, hearing and generation, which appeared to be lost for ever, we entertained some hope of his recovery. However, a new train of inflammatory symptoms became established, and went on increasing progressively, notwithstanding the antiphlogistic measures which we employed to overcome them. The pain in the head and spine caused the patient to utter the most doleful screams; he was continually drawn up in his bed, lying on the same side with the wound; the slightest movement caused him to have convulsions, and whenever he raised himself up for the performance of his alvine functions, he would fall into frightful syncopes; as a last resort, I ordered the application of a large blister between the shoulders, and prescribed cooling and mucilaginous drinks; but he grew worse from day to day; he was, finally, attacked with opis-

thotonos, and expired February 9th, 1809, on the thirty-ninth day after he had met with this accident.

During the autopsical examination we made the following discoveries: the occipital bone had sustained a considerable loss of substance; the slit into the dura mater, to which we have alluded, corresponded to the centre of the right lobe of the cerebellum, which had sunk downwards and was of a yellowish colour, but free from suppuration or effusion. The medulla oblongata and spinal marrow bore a dull white aspect, were of a greater consistence than is natural, and had lost about a quarter of their size; the nerves arising from them appeared to us also to be in a state of atrophy near their origin.

We are authorized to infer from this pathological fact, that the first and chief result of inflammation of the brain is, as we have seen repeatedly confirmed, the hardening of the cerebral and nervous substances, whilst atrophy and ramollissement are merely its consecutive effects.

Without relating here, in full, the case of Raymond, of whose complaint we have already given (see p. 134) a detailed account, when we were treating of the injuries of the frontal sinuses, we may nevertheless be indulged in repeating: 1, that in consequence of the violent fall of the patient on the back part of the head, at the time when he had been struck on the superior orbital ridge of the right side, he was deprived of the functions of vision and smelling of the same side; 2, that a nervous excitement manifested itself, which threw both extremities of the right side into a state of violent contraction, soon assumed a tetanic character, and terminated, at last, by atrophy of the two limbs; 3, that the right testicle, after becoming tumefied and occasioning violent pain to the patient, was reduced likewise from its original size to almost total disappearance, without the penis exhibiting, after the accident, the least sign of erection; 4, that the incessant and deep seated pain of the patient in the right lateral region of the head, became so intense, that he could not bear the slightest touch in that direction, without uttering screams, accompanied by horripilations and convulsions; 5, that, to our great surprise, the hair and whisker of the right side bristled, and conveyed

an exquisitely painful sensation upon the slightest touch, or on cutting the smallest number of these hairy productions, although a sharp edged pair of scissors was used for that purpose; 6, that this man remained in this state of contraction and nervous spasm during the whole winter of 1822 to 1823; after which, upon the occasion of the heat in the summer of 1823, a salutary revolution was suddenly wrought in him, which seems to have been developed under the influence of copious sweats, excited by the heat of the season and by the emollient baths which we had advised him to use.

Thus the exquisite sensibility to which he had been subject, was subdued; he could allow his hair to be cut, and his beard to be shaved without much pain; the tetanic contraction of the hand and arm gradually diminished; the hand and fingers opened and extended; all his nails, which had been necrosed and were hideous to look at, fell off, and were replaced by others of proper formation; all the other functions were by degrees re-established and he, finally, returned home in good health.

Now, that we believe we have traced the march of acute inflammation of the cerebellum, that is to say, the effects of the physical lesions by which this organ is liable to suffer, we intend to exhibit, in the two next observations, the phenomena which the same inflammation has presented to us, when it terminates by suppuration and the almost total destruction of one of the lobes of this part of the encephalon.

Towards the end of December 1822, John Dureng, a workman of the third company of artillery of the guards, aged 24 years, of a robust constitution, while engaged in carpenter work, was struck by a piece of wood on the right side of the head, where during the first few days he felt a pretty smart pain; he continued, however, his occupation until January 5th, 1823, when he was carried into the fever ward of the hospital of the guards, complaining of nothing but headach, without assigning the cause which had occasioned it. A phlegmonous engorgement having manifested itself behind the right ear about the eighth or ninth day, he was transferred to the ward of the wounded patients. We directed emollient applications

over the tumour, and put the patient upon the use of refrigerant mucilages and mild anodynes in order to induce sleep. The abscess did not fail to show itself, and from the third day its fluctuation became perceptible. A free incision into the centre of the tumour discharged about three ounces of whitish pus, mixed with clots of grumous blood. The opening of this abscess exposed the whole surface of the mastoid process, which, doubtless, was the part which had sustained the injury. Upon the wound being unloaded and cleansed, it cicatrised, and the patient recovered. He had lost his hearing, however, on the same side, and his pronunciation was rather embarrassed; at length he was well enough to leave the hospital, on April 5th following, it being the third month after his admission into the fever ward, and he repaired on foot to Vincennes, the place of his garrison. It is to be remarked that, in the course of his illness, the functions of his senses, with the exception of his hearing and speech, as well as the intellectual faculties, had never been disordered in the slightest degree; all the other parts of the body had alike preserved their integrity and plumpness.

Two days afterwards we were informed that this labourer had been reported for dead at the hospital. This was on the 7th of April. We were unable to obtain the slightest cue as to what happened to him before his last accident; we only learnt that after having spent the day of his arrival and the next with his comrades, drank and eaten like themselves, he had been found dead on the morning of the seventh, with his head inclined on the edge of his bed.

The first twenty-four hours having expired, we proceeded to open the body, which was done in our presence by M. Desruelles, one of our assistant surgeons. The body was stiff, displaying his embonpoint; the face livid and swollen. The cranium being sawed, the sinuses of the dura mater were found engorged with black and fluid blood; the membranes presented nothing of pathological interest. The cerebral substance was much more dense than it is in its normal state. The lateral ventricles and the spinal canal contained a large quantity

of serum, to the amount, as was estimated, of three or four ounces.

The right hemisphere of the cerebellum was entirely disorganized by an abscess which pervaded its whole substance. The purulent matter being of a yellowish white colour and gelatinous appearance, was enclosed in a kind of cyst, the thin parietes of which were of a pearly white aspect; the lining corresponding to the base of the cerebellum was covered with a layer of coagulated blood, and presented a small fringed opening through which a part of the purulent matter had escaped into the occipital fossa in the direction of the foramen magnum. The tuberculæ quadrigemina and the opposite hemisphere of the cerebellum were reduced from their original or normal size.

The viscera of the thorax and abdomen exhibited nothing of pathological moment; but the testicle of the affected side had been reduced to one half the size of that of the left side; it may be said to have been in the second stage of atrophy.

Before we indulge in any remark on this disease, we shall proceed to give an account of the second case, the principal considerations of which have the greatest analogy with those of the preceding.

A Swiss soldier, named Granfort, fifty years of age, was admitted into the hospital in the early part of May 1823, on account of an erysipelatous affection of the whole left lateral part of the face, attended with habitual cephalalgia, a sense of weight in the head, a continual tendency to incline it to the affected side, deafness of the ear of the same side, and great difficulty of speech. His pulse was febrile, and his strength appeared to be greatly reduced. These symptoms had been occasioned by a fall which the patient had sustained on this side of the head a few days before the appearance of the erysipelas. Emollients were applied to the tumefied parts, and internally we prescribed mucilaginous diluents, with mild anodyne draughts for the night.

After persevering for several days in this treatment, a marked fluctuation became perceptible in the centre of the

tumour, into which we now made a free incision which exposed the whole extent of the abscess. The mastoid process was denuded and perforated by a curious communication of the abscess with the internal ear and meatus auditorius, through which a portion of the purulent matter escaped. Five or six weeks afterwards the walls of this abscess were clean; the wound began to cicatrize from the circumference, and the patient seemed to think himself a good deal improved; still, he complained always of a sense of weight in the head, of pains in the occiput, with a great tendency to rest it on the affected side; when standing he could with difficulty only preserve his equilibrium; he spoke seldom or never, and when he did his pronunciation was much impeded. The integuments of the occipital region and neck of the same side were very tender; but the mental faculties remained unimpaired. Whenever he could not articulate, which frequently happened to him, he answered by signs to every question proposed to him. The arm and the hand of the left side were threatened with paralysis; but the motions of the other limbs had in no respect whatever experienced the least alteration. After about two months spent in a state of irksome convalescence, during which he had always exhibited a saffron complexion, he suddenly relapsed into a state of lethargic drowsiness, and expired twenty-four hours afterwards.

Thirty hours after death the body was examined, which operation was, in our presence, performed also by the same physician, M. Desruelles. The cranium, the principal object of our search, having been opened, we found the dura mater of a deep brown colour, so many of its proper blood vessels being congested with black and fluid blood. The arachnoid was opaque, and in some places of a dull white appearance. The deep seated blood vessels of the cerebral substance were injected also, and the latter was of a firmer consistence than natural; the lateral ventricles contained a little colourless serum. The brain being detached and removed from the cranium, and the tentorium being slit open, we found in the left lobe of the cerebellum about three tablespoons full of pus of a whitish and gelatinous aspect, which had encroached upon,

or rather displaced entirely, the hemisphere of the cerebellum; this purulent substance was enveloped within the pia mater, which had acquired a somewhat firmer consistency, and as in the subject of the preceding case, assumed a pearly colour. The other half of the cerebellum was shrivelled, and the medullary substance forming the arbor vitæ, was of a greyish colour and very dense. Pus was effused into the lambdoidal fossa and beneath the pons Varolii of the medulla oblongata. It was in this fossa of the base of the cranium where we met with the carious spot which communicated with the internal ear, and which was surrounded by adhesions of the membranes.

The stomach and the intestines exhibited some marks of chronic inflammation. The liver being of a green marbled appearance was reduced to one half its primitive or normal size, and was lodged deeply in the hypochondrium; its texture was dense, friable, and almost black. The gall bladder was greatly distended, and full of deep green and viscid bile. The ductus choledochus was much contracted, and the diameter of the vena porta considerably smaller than is ordinarily the case.

The scrotum and penis were so much reduced from their original size that they might be considered to have been in the second stage of atrophy.

It is evident from the progress of this slow inflammation, which may be styled traumatic, that in the two last cases its essential cause consisted in a violent shock received on the mastoid region of the right side in the first, and on the left side in the second case. Although this inflammation had terminated by copious suppuration in both, we observed:

1. That the intellectual faculties, and (with the exception of hearing and speech) the sensitive functions, also, had never been disturbed.
2. That the organs of locomotion had not undergone a decided change in any part of the body, excepting very slightly in the arm of the Swiss guardsman, and only towards the termination of the disease (on the same side with the affected part of the cerebellum).
3. That the animal sensibility, so far from having been

blunted, at least in the posterior regions of the head and neck, had risen in both in the early stages of their complaints, and if in the latter period it had subsequently declined, especially in the case of the last subject, it was owing to the circumstance that the fever of re-absorption, which affected him in the last stage of the disease, had simultaneously destroyed the vital principle in every organ; so that the patient had fallen, several days before death, into a state of adynamia or absolute prostration. With respect to the first case, the absorption of pus, contained as it was in a kind of cyst, proceeded with more difficulty, and the patient preserved the equilibrium of his vital functions up to the moment, no doubt, when this purulent cyst actually burst, and when its contents were diffused beneath the medulla oblongata and into the spinal canal.

4. After these facts and precedents, it is evident that the injuries of the cerebellum necessarily diminish and impair the vital principle of the organs of generation, weaken their functions, and induce in them a state of atrophy.

5. The above facts prove, moreover, contrary to the assertion of several authors, that all injuries of the cerebellum, even when they embrace the arbor vitæ, are not always essentially mortal.

I shall conclude now by making some extracts from two remarkable cases which form a part of my memoir on saccocœle. The subject of the first is a drummer of the grenadier ex-guards, about twenty-seven years old, of an athletic frame, brown complexion, and withal, with very handsome black mustachios, upon whom, in 1810, I had operated for extirpation of the left testicle which had become cancerous. This man, after his recovery, returned to his regiment, made the campaigns of 1812, 1813 and 1814, and always continued to do the duties of his station. He repaired once more to the hospital of Gros Caillou on account of an obscure cancerous affection of the other testicle, which had grown to the size of the fist. After having first unavailingly employed all the remedies which are calculated to induce resolution, leeches, dissolvents (fondans) and mercurials, we decided on performing upon him a second operation, which we believed to be indispensably and urgently

indicated by the lancinating pains which he almost continually suffered at the diseased part, by the slow fever and the state of marasmus to which he had been reduced. Extirpation being accomplished, we discovered, indeed, that the carcinomatous virus had attacked the entire substance proper of the testicle and of its epididymis. We had some difficulty in restoring the general health of this drummer; however, after several months rest, he was again in a fit condition to resume his duties, which he would continue, notwithstanding the loss of both his generative organs; after which I finally lost sight of him.

In 1821 the same individual was again admitted into the hospital for an incised wound which he had received in single combat in the right thigh. I had some difficulty to recognize him; his mustachios had grown very thin, and his physiognomy become quite effeminate; at length, in order to put me in mind of him, he told me that I had operated on him twice, the first time ten years, and the second time upwards of one year ago. Being convinced of the truth by an examination of his genitals, I examined his neck, which he informed me was now much less prominent than it had been prior to the first operation; I noticed, indeed, very plainly, that the sub-occipital protuberance on the side of the testicle which had been extirpated first, was much more depressed than that of the opposite side; and the whole occipital region of this man appeared to us to have been considerably reduced. In other respects he enjoyed good health, and had some embonpoint. This interesting individual was introduced to Dr Gall by Dr Gim-melle, one of our principal assistants.

The second case was I. B. Dandé, a private of the second regiment of the guards, twenty-six years old, of a lymphatic temperament and serofulous diathesis, who, in 1823 and 1824, had been treated for rachialgia, with caries of one of the upper dorsal vertebræ, and accompanied by an abscess from congestion which had been developed behind and beneath the scapula, so as to produce a fluctuating tumour, of an oval shape, projecting about three inches, and measuring seven in circumference. By means of moxas, the number of which amounted

to fifty, successively applied, the progress of caries of the vertebræ was arrested, and the purulent matter of the abscess, which depended upon it, was absorbed. After a residence of seven or eight months at the hospital, the patient, finding himself perfectly restored to health, at least as to appearances, rejoined his regiment and again entered upon the active duties of the service. He experienced, however, continually, a slight embarrassment in the motions of the trunk, and whenever he attempted to raise the arm of the side of the diseased shoulder. He discovered also that he had lost a good deal of the size which he had when he entered the regiment, which proves a loss of substance of the bodies of the carious vertebræ which subsequently could not approximate each other, except by occasioning a shortening of the whole length of the man, in proportion to the loss of bony matter. At the time of his entering the regiment, Dandé measured 710 millimètres, while on February 10th, 1827, when I caused him to be measured again with the same measure and under the same precautions as those of the regimental survey, his size amounted to 678, which gives a reduction of 32 millimètres, equal to  $1\frac{22}{100}$  inch.

After having enjoyed pretty good health for about two years, he was, at the end of some maneuvre, suddenly taken with a smart pain in the left testicle which swelled and obliged him to go to the hospital of the guards, where he was admitted during the latter part of April 1826. The inflammatory appearance of this organ had induced the medical officer of the regiment to believe that it had been caused by the suppression of a gonorrhœa. Although the patient protested never to have been affected with any syphilitic complaint whatsoever, yet he was confined in the venereal ward, where all the usual remedies were employed calculated to overcome both the supposed syphilitic cause and its consequences.

The disorder having grown worse, and the swelling of the testicle having considerably increased, the extirpation of this organ was considered indispensable, and was performed accordingly by one of my colleagues, Doctor Poirson, surgeon major in charge of that department. The operation was not attended by any remarkable occurrence. After two months

nursing he rejoined his regiment, apparently again in the enjoyment of perfect health, and continued to do service till the month of November of the same year, at which period he perceived that the other testicle presented symptoms of diseased action similar to those he had observed in that which he had lost. He immediately returned to the hospital towards the end of the same month, and was transferred this time to the ward appropriated for the wounded. We employed, without success, all the remedies best suited to induce resolution of this organ. Every thing intimated a carcinomatous vitiation, and indicated the accession of a slow symptomatic fever. Notwithstanding our unwillingness to deprive him also of this last organ, we deemed it necessary to extirpate the testicle, which became daily more and more a source of infection to the patient, already much exhausted. We, therefore, performed this second castration, which was not attended by any unpleasant symptoms, and he recovered in the space of a very few weeks: but one remarkable circumstance is, that the nape of the neck has been sensibly depressed ever since the first operation, and that the occipital protuberance of the side of the testicle first extirpated, is much smaller than that of the opposite side. The whole frame of this man is emaciated; his beard and whiskers are almost entirely gone; and, in fine, it is obvious that the total loss of the genital organs has, in the full sense of the word, exercised a marked influence upon the cerebellum, since the occipital region exhibits in this man a deep and abnormal depression, being the consequence of atrophy which has settled alike upon all the bones of the cranium, on the dermoid tissue of the face, and most visibly upon the bulbous roots of the beard which has disappeared. Thus, this soldier, who was exhibited before the Philomathic Society, may be considered as a highly curious subject, because of the remarkable physiological phenomena which in him have succeeded one another, after the serious disorders which he has had to go through.\*

\* The sympathetic inflammation which the abstraction of the genital organs communicates also to the cerebellum of the lower animals, is very evident to

In concluding the account of the diseases and injuries of the encephalon, we now propose to treat of a disease which we believe to be seated exclusively in this organ,—I allude to nostalgia.

the anatomical physician. We have remarked, indeed, in comparing the cranium of these animals with that of the males of the same species who were provided with those organs of which the former had been deprived, that the occipital region of those who had undergone castration declined or became depressed by degrees to such an extent, that, after the expiration of a certain period, the cerebellum of this class of animals, all circumstances being equal, is reduced to a much smaller volume than that of the males of the same species which have been permitted to keep their testicles. Nay, it would seem that the anterior region of the head in the former expands in the same ratio of the reduction which takes place in the occipital region. This phenomenon may be observed in capons, for example, in whom the cranium assumes the shape of a helmet.

## OF NOSTALGIA.

EVERY thing proves, in opposition to the opinion of some anatomists, that the brain or the encephalon is the essential or exclusive vehicle of every sensation, whether spontaneous or conveyed to this organ from without by some external agency. A great many facts relative to the injuries of the brain which have just been detailed, and numerous autopsical examinations which we have made within the last forty years, have convinced us of the truth of this assertion, so long established by the highest physiological authorities, Morgagni, Haller, Vicq-d'Azyr, Scemmering, and Doctor Gall.

Indeed, it can hardly be doubted that the mental affections, like the passions of the soul, have their exclusive seat within the brain; but with respect to nostalgia, which has given origin to so many hypotheses and contradictory opinions, as to its seat and morbid effects, a question arises whether it be seated in this organ, and whether it changes in reality the integrity of its functions?

This is a very grave question, which I shall not attempt to decide; I shall for the present confine myself merely to relate some facts respecting this genus of disease, and carefully describe all the phenomena which accompany or characterise it, and the differences which exist or may exist between this morbid affection and many other diseases which also have their seat in the brain.

It is very evident that all sensations are conveyed to this organ, either by the nervous system, with which it is in immediate connexion, or by the senses which also maintain with it an intimate and direct correspondence. After this unex-

ceptionable truth, the brain must necessarily receive the first effects of these sensations, and in proportion to the more or less decided influence which those effects shall produce upon its pulpy substance, will be the relative changes in the internal organs which directly or indirectly derive their vital properties from the encephalic nerves. By pursuing this nervous correspondence a little further, it will be easy to arrive at an explanation of the causes of certain pathological phenomena which have escaped the notice of the observer.

Thus, the first effect of the ardent desire which he who is seized with nostalgia feels to return to his native land, must, if it cannot be satisfied, necessarily be attended by a painful anxiety which progressively increases; and this passion, the result of the emotions transmitted to the brain by the senses, appears first of all to affect its periphery, where, probably, the organs of induction reside.

The first injurious consequences of such moral impressions are productive undoubtedly of some kind of expansion of the substances of the brain, of the engorgement and torpor of the vessels of this organ, and successively of those of the membranes which envelope and line its cavities; the first pathological phenomena which, under such circumstances, may be observed, are, therefore, an impaired condition or aberration of the intellectual functions. These effects afterwards spread slowly or progressively to the deep seated parts of the brain which furnish the organs of the senses and of locomotion with nerves, so that the functions of these organs become enfeebled also, or undergo changes which are marked by their own peculiar symptoms.

Injuries of the head, or any other external causes which may infringe the integrity of the brain in some place of its periphery, or of its anterior and superior surface, are apt to produce analogous results. In cases of injuries of the head, which operate in an inverted ratio from the interior towards the surface (like those which are occasioned by mechanical causes striking in an oblique direction from the base of the cranium towards its interior); in cases of metastases which transmit their influence from some point, more or less remote, towards

that same part; and, finally, in those accumulated fluid secretions which occur in the cerebral cavities, the alteration of the functions of the brain cannot but exhibit a different career, and be attended by different results. Here, however, the pressure bears upon the origin of some or all the nerves of locomotion, upon those of the mixed organs, and upon those of the senses, the functions of which are soon disturbed and impaired in a corresponding degree, while the intellectual faculties may remain unmolested entirely or in part; for, it is no doubt with these faculties as with those of the organs of sense, that is to say, as Doctor Gall maintains, the former can and must perform their functions separately.

I shall not recapitulate the phenomena or the symptoms which are ordinarily occasioned by superficial injuries of the cranium, attended with fracture and with direct or indirect lesion of the brain; they have been described already in the preceding articles and observations. However, these phenomena bear a great analogy to those which I am about to detail in this essay.

We will commence, then, with a statement of the facts which we have witnessed in a great many nostalgic patients, both during their life and after death. In them, as in the majority of deranged people, the mental faculties become first affected, and the functions of the life of relation undergo successive changes with more or less rapidity; all nostalgic persons, in fact, are subject to flights of the imagination. They think they perceive from afar smiling and enchanting pictures in the places of their nativity, however sterile and uncultivated these may be; their parents and friends, clad in rich dresses and evincing the most affecting emotions of joy, come on purpose to see them. The first moments are consequently characterised by excitement, which is manifested by a spontaneous increase of heat of the head, by a greater activity of the pulse, by restlessness of the patient, redness of the conjunctivæ, unsteadiness of the eye, precipitate and inaccurate elocution; to these are added a sense of oppression, pandiculations, sighs, constipation, and vague pains in different parts of the body.

This state of pyrexia will be succeeded by a feeling of com-

pression and restraint pervading every organ. The stomach and the diaphragm, receiving no longer, as in the healthy state, the accustomed stimulus of the pneumo-gastric nerves, lapse into a state of torpor, manifesting, forthwith, symptoms of gastric derangement, which at all times is only a consecutive disorder after injuries of the brain. The digestive functions are disturbed, fever grows more intense and travels on with its usual train of symptoms.

In the third stage, asthenia and prostration of strength are superadded; the patient now becomes dejected, he sobs and sheds tears; not unfrequently he evinces an aversion to food and occasionally to liquids of a transparent colour, as pure water for instance, which in some degree imparts to him an hydrophobic character. At length, life becomes a burthen to him; and in this state he inflicts death on himself without any hesitation, unless the hand which is to perform the act have previously been seized with paralysis; or rather his vital powers gradually become extinct, when he expires without knowing himself.

During the retreat from Moscow, we have seen a great many of our companions perish in this way, whose brain had undergone some changes in the same direction, in consequence of cold of from 25 to 28 degrees (Réaumur).

Autopsical examinations of nostalgic individuals lead to the following results : 1. The surface of the anterior lobes of the brain is in a state of extensive inflammation, interspersed with patches of suppuration, the seat and extent of which are varying. The arachnoid and pia mater participate in this inflammation; the substances of the brain are hardened and their arterial vessels turgid with black and fluid blood. 2. The lungs also are engorged; the cavities of the heart are inordinately dilated, and filled with coagula or with blood of a blackish aspect; the stomach and the intestines are distended with gas; their mucous membrane is injected, yet displays no symptom of actual inflammation. Therefore persons will not, as has been conjectured, die of gastro-enteritis, but rather of the effects of the changes of structure in the brain.

From our remarks, and the numerous facts which we have

collected, we believe that premature ossification of the sutures of the bones of the cranium, as well as of the arteries of the encephalon, predisposes to nostalgia, and abridges the life of the individual in whom these phenomena present themselves. The contrary might be said of those in whom this kind of ossification is retarded, and occurs only at a very advanced age. This we have, at least, observed in the heads of a great many old people of upwards of seventy or eighty years of age. Besides, it is within the power of every one to verify the correctness of these assertions. In the case of our illustrious associate in Egypt, Monge, whose death had been preceded by profound melancholy and intolerable weariness (*ennui*), the cerebral arteries were in a state of ossification. This worthy old gentleman who, previously to the commencement of the illness of which he eventually died, had honoured me with a visit, shed tears of sorrow on account of his having lost his principal patrons, officers and titles. Now, there is no doubt that this cause had largely contributed towards the spontaneously diseased process of the ossification of his cerebral arteries.

Similar appearances were observed in the brain of the celebrated Fourcroy, whose premature death had been accelerated by the same causes, by profound melancholy and disappointment.

We shall transcribe here, from a letter of one of his associates, the necropsy of Lord Byron, who, at an early age, died in Greece of a fever which appeared to have been settled in the brain.\* 1. The bones of the head presented a very remarkable compactness; the cranium, having no sutures, resembled that of an old man of eighty or ninety years of age; it might be said to have been but one bone without any intermediate diploë. 2. The dura mater adhered closely to the internal surface of the cranium; and the vessels of this membrane were injected and distended. 3. Those of communication between it and the pia mater were filled with gas and serum of a whitish appearance. 4. The parenchyma of the brain was intersected by many vessels containing black blood;

\* The extract of this letter was given to me by the Baron Puymaurin, a member of the Chamber of Deputies.

the lateral ventricles were filled with limpid serum; the other ventricles and the spinal canal also contained a good deal of fluid of the same character. 5. The medullary substance extended beyond its ordinary limits into the midst of the cortical substance, the thickness of which was much reduced in a corresponding proportion. 6. The convolutions of the brain appeared to have been more numerous than common, and the fissures of separation very deep. (I have also had occasion to notice the same phenomenon in the brain of other illustrious personages.) 7. The whole volume of the brain, as far as the spinal marrow exclusive, when stripped of its membranes, weighed about six pounds (eight ounces weight, poids de marc). In other respects the autopsy of this great man presented nothing particular, unless perhaps a slight hypertrophy of the heart, and an accumulation of dry fæcal matter, which implies an obstinate constipation, to which this lord, indeed, is said to have been subject all his life.

We may conclude from what the author of this autopsical narrative reports, that this poet could not have lived many years more, considering the pathological condition of his cranium, the permanent irritation to which his brain seems always to have been exposed, as well as the obstinate constipation which doubtless was one of its consequences, and which made him wish for his death, since he never knew how to make the least exertion to extricate himself from this complaint. Nor would he, during his last illness, permit any one to abstract even the smallest quantity of blood from him. In fact, this last assertion has found its way into the public prints. Byron, therefore, fell a victim to extreme melancholy, which, so far from disposing him to avoid the causes tending to sever the relations of life, determined him, on the contrary, to seek them with some degree of avidity.

At all events, I hope that the short remarks which I indulge in deducing from these facts, may incline medical men to institute new inquiries into the nature and career of cerebral diseases, the anomalies of which are perhaps more numerous than is generally believed.

The inhabitants of cold and moist countries, as Holland for

instance, or of mountainous districts, like Switzerland and Brissgaw, are more liable to moral impressions producing nostalgia, a remark which has been already made by several celebrated physicians. Thus, the troops chiefly of these nations, by virtue of this moral conformation, and of their generally lymphatic constitution, suffered most from the dire vicissitudes which, during the campaign of Moscow, we had been doomed to undergo; whereas on the burning soil of the ancient world (the opinion of certain writers who have never visited these regions to the contrary notwithstanding), I have never in one single instance observed the least symptom of nostalgia. They all had formed so correct and favourable an idea of Egypt,\* that they considered her like their second country; there were, indeed, few of our companions who did not sincerely regret this climate.

Several Swiss of the royal guard have been sent in succession to the hospital for the purpose of being cured of certain undefined affections which very soon assumed the character of nostalgia. This was more especially remarked in 1820, and still more so during the extreme rise of the barometer. All mental diseases are liable to grow exasperated under such circumstances, of which I possess unequivocal proofs. The first and the most remarkable case of this kind was a soldier of the first Swiss regiment, about 30 years of age. He was at first admitted into the fever ward, where his situation displayed to his physician Doctor Cornac no symptom of an alarming nature, who nevertheless administered to him every possible comfort. One day, while visiting the hospital, I was informed that this unhappy man had just attempted to commit suicide, a few moments after being visited by his physician. I immediately hastened to his assistance, and found him actually bathed in his own blood and almost expiring, in consequence of a large wound which he had inflicted on himself in the praecordial region by means of a knife, called an *eustache* (claspsknife). The wound was situated immediately below the left papilla, and extended obliquely from behind forwards about three inches

\* See the Campaigns in Egypt and Russia, vol. i. and iv. of my Memoirs.

in length by pursuing the direction of the space between the sixth and seventh ribs. There were some muscles divided, and the instrument had penetrated into the chest through the intercostal space. A very large quantity of blood of a vermillion and frothy aspect had issued and continued to issue from the wound, which made me suspect the existence of a deep seated injury of the lung and even of the pericardium. The lips of the patient were discoloured, his eyes fixed, watery and half closed; the pulse was almost gone and his voice entirely extinct; the extremities were cold and respiration nearly suppressed. I found to my great surprise on the edges of this wound seven different incisions which divided the substance into as many irregular and parallel strips of two or three lines breadth. It was proved also that the patient had repeated his operation eight or nine times, and no doubt until his strength had become exhausted by the loss of blood proceeding from the injury of the lung. If the patients in the ward and the nurses had not been apprised by the plaintive scream which he uttered at the last stroke, and if the instrument had not been found closely locked in his right hand, the medical jurist would not have believed that such an act could have been the result of the intuitive strength of the individual.\* I will attempt to give some explanation of this phenomenon at the end of the case. Notwithstanding the desperate situation of the patient, I hastened to remove the lacerated strips, and to simplify the wound as much as possible, in order to bring about a reunion and to prevent, of course, the passage of the external air. Although the result was imperfect, I, nevertheless, succeeded in suspending the fatal career of the unfortunate man, and recalled him to some degree of life, which encouraged me to conceive some hope for his welfare.

The development of the pulse, the return of heat, motion,

\* During my education at the general hospital of Toulouse I remember that a lunatic, having secreted a razor under the straw of his bed, gave himself five or six incisions in the abdomen, nearly all in a line. One of them having penetrated into its cavity to the extent of two or three inches, caused a protrusion of almost all the viscera, and the patient perished the sooner as he himself pulled off a part of his intestines.

respiration and of the colour of the lips, announced the cessation of the internal hemorrhage and the reaction of the vital powers. I directed embrocations of hot and camphorated oil of chamomile to be made to the extremities and abdomen, and antispasmodics, mucilaginous draughts and sweetened emulsions to be given internally. I ordered the application of ice to the head, and endeavoured to soothe the mind of the patient by promising him a furlough to return to his country, if such was his wish; but he paid not the slightest attention to these proposals, which his state of mental derangement would not permit him to appreciate. He had sunk, moreover, into such an absolute physical apathy as not to evince the least degree of pain during the operation made at the moment when he was being dressed for the first time, and seemed to give himself up unconditionally to the fate which awaited him. At last he expressed no longer a desire for any thing, every function of the life of relation being greatly enfeebled, and those of the internal organs in a perturbed condition. Notwithstanding this he enjoyed pretty good rest for several hours, uninterrupted by the slightest unfavourable symptom. But, the patient having torn off the dressing during the night, symptoms of traumatic inflammation became manifest the next day and travelled with extreme rapidity. All the remedies usually indicated in such cases were insufficient, and he died in the most dreadful agony on the fifth or sixth day after he had attempted his life.

On inspecting the body twenty-four hours after death, I found the wound, as I had intimated before, penetrating into the left cavity of the thorax, through the intercostal space between the sixth and seventh rib: the blade of the instrument had in the first place pierced a part of the lung, after which it had grazed the pericardium and lacerated the phrenic nerve of the left side. There were about two pounds of blood and serum effused into this cavity. All the serous membranes were inflamed and covered with a layer of albumen, in which bloodvessels were ramifying already for the purposes of inosculation. The lung was divided about one inch deep and the remainder of it was hepatized. The cavities of the heart were much dilated and filled with black and liquid

blood. The right lung and the abdominal viscera were healthy. On opening the cranium, the sutures of which were almost completely effaced, we found a layer of purulent albumen which covered the whole periphery of the brain and involved besides the arachnoid membrane. There might be perceived, also, several suppurated spots in the cortical substance of this organ, especially about the anterior lobes and superior margin of the hemispheres. The sinuses of the dura mater and all the blood vessels of the encephalon were engorged with black and carbonized blood: the ventricles contained a pretty large quantity of serum, but the base of the brain and cerebellum was healthy.

It may be inferred from these facts that the cephalitis which had been developed gradually under the influence of the profound moral affection, which had been occasioned, in this Swiss soldier, by the ardent desire to return to his native land, must have preceded the attempt at suicide, which in itself may be looked upon rather as an automatic act, independent of the will of the individual. I shall endeavour to explain this singular phenomenon.

I have already remarked that the animal sensibility of this nostalgic patient had been nearly extinct at the time of the wounds which he had inflicted upon himself, for he evinced not the slightest symptom of pain while the incisions were made, in order to dilate the corners of the wound and to cut off the irregular flaps of the integuments of which I have spoken above. Unless this sensibility had been extinct from the commencement of the disease, he could never have repeated as often as eight times the painful and difficult operation which he performed on himself with a very bad knife. Yet, how shall we account for the cause which set the muscular power in motion to impel the hand of the unfortunate man with so much strength, while his sensibility was almost gone and his intellectual faculties were in such a state of aberration and weakness that to the questions put to him he replied only by monosyllables entirely foreign to the subject? 1. This, as well as other facts analogous to it which will be related in the sequel of this memoir, appear to me to demonstrate that the nervous cords

which produce the sensibility of relation and those which are subservient to the functions of locomotion have a distinct origin in the brain or in its prolongations, which renders the hypothesis probable which I have stated, when speaking of the nerves of animal life,\* on the occasion of the electric telegraph of the celebrated Sœmmering. 2. The consecutive phenomena exhibited in this Swiss soldier are equally in favour of the theory of Doctor Gall on the seat of the organs which are subservient to the intellectual faculties. This celebrated anatomist places these organs in the convolutions occupying the surface of the superior and anterior half of the cerebral hemispheres. Persons with dropsy of the ventricles, or other spontaneous congestions making an anomalous compression on one or more places of the base of the brain, so as to produce total or partial paralysis of the organs of locomotion without affecting their intellect, furnish still more proofs in support of this opinion. For the further confirmation of these remarks I shall now proceed in laying before the reader the result of my investigations in those individuals who have been treated under my own eyes.

John Humbert, a guardsman of the 5th regiment of infantry, entered the hospital in August 1820, on account of a slight contusion of the chest which he had received in consequence of a fall. He had scarcely recovered from the effects of this accident, when he evinced a very strong desire to go to his native province (one of the valleys of Franche Comté): I forthwith directed a convalescent pass to be made out for him, and promised him that he might depart as soon as it should be returned from the war department; at the same time I prescribed a mild regimen and pediluvia. Notwithstanding these precautions, symptoms of nostalgia suddenly made their appearance and became developed with extreme rapidity. The barometer stood at that period at twenty-eight inches and several lines.

The first apparent symptoms in this young soldier were signs of mental aberration and pain in the head. He spoke

\* We shall re-insert this memoir of ours on the origin of these nerves at the end of the article on the injuries of the head.

little, his ideas were incoherent, and during nearly the whole night he was in a state of somnambulism. Notwithstanding the cephalalgia of which he at first complained, he had no other pain besides; yet he pressed his hand habitually on the forehead; he was restless and in a continual state of insomnia; the extremities were always cold and his pulse slow and irregular. An unnatural heat could be perceived on the vertex, the vessels of the conjunctiva were injected, the eyes watery, and his looks unsteady. He ate nothing and evinced a very great repugnance to use clear drinks, such as pure water, but enjoyed in some degree coloured and bitter decoctions. This state of exacerbation was soon followed by some kind of general collapse. The powers of locomotion declined progressively to such an extent that the patient could no longer raise himself up in bed; his sensitive functions became reduced also in the same proportion; and finally, he fell into a state of lethargy, during which he answered none of the questions addressed to him, while his physical sensibility was almost altogether extinct. I employed at first but few curative remedies, but seeing that the disease began to assume a serious character, I decided upon opening the jugular vein and subsequently also the temporal artery, and directed sinapisms to be applied to the feet, ice to the head and dry and scarified cups to the hypochondriac and abdominal regions, besides which antispasmodic mucilaginous drinks, emollient anodyne enemata and camphorated oily embrocations were prescribed. The result of this treatment was a temporary calm; but the cerebral affection became again developed, and travelled so rapidly, that the stimulus conveyed by the pneumo-gastric nerves to the stomach, the lungs, and no doubt also to the heart, was there annihilated; the functions of these organs were in consequence greatly impaired by some kind of paralytic affection or stupor, which occasioned the engorgement of their membranes, as well as all the characteristics of phlegmasia peculiar to each of these viscera.

Such is ordinarily the origin of angina pulmonalis, gastritis and enteritis, which, according to their concomitant causes, become developed with more or less facility; but they are the

result of disease of the brain. To return to my subject, he fell into a state of complete ataxia, and expired, apparently without any pain whatever, in the night of the ninth to the tenth day after the appearance of the first symptoms.

On inspecting the body twenty-four hours after death, I perceived, as in the subject of the first observation, the whole intestinal tube considerably distended with gas, and the mucous membranes of the stomach and intestines injected, yet without symptoms of inflammation. The liver of a brownish colour was much engorged and stretched beyond the margin of the false ribs.

On opening the cranium and vertebral canal I discovered a layer of albumen covering the whole periphery of the hemispheres of the brain; it was situated between the dura mater and the pia mater; patches of suppuration of a yellowish aspect penetrated pretty far into the anterior lobes of this organ, and a pretty large quantity of reddish serum was contained in the lateral ventricles. The different substances of which the encephalon is composed were thickened, and the spinal membranes in a phlogose condition.

A third soldier who died of the same disease and at the same time, in the fever wards of the hospital, presented the same phenomena before and after death.

The subject of the following observation has during his illness and after death displayed remarkable peculiarities. Francis D., a private of one of the regiments of the guards, aged 23 years, born in the department Du Nord, on the frontiers of Belgium, fair and of lymphatic temperament, was admitted into the wards of the wounded of the hospital of Gros Caillou, towards the end of February 1820, on account of some pain in the left shoulder, accompanied by numbness and stiffness in the arm of the same side. He evinced an extreme repugnance to the military profession, and expressed to his comrades his desire to return to his native province. Combined with these particular circumstances were all the symptoms of an exhaustion of his moral and physical powers, which was the gloomy result of onanism, to which, by his own confession, this young man had been given without restraint. I ordered

the successive application of scarified cups and of several Chinese moxas to the parts affected, whereby the pains were appeased and the motions of the arm restored. The patient, at length, considering himself cured, left the hospital and returned to his regiment. I, nevertheless, took the precaution to recommend him to his surgeon-major, on account both of his moral condition and of the affection for which he had entered the hospital, and which was by no means yet entirely removed.

In this situation he remained for several days, but another disease became established, and on the 1st of April following he was again brought into the hospital and lodged in the fever ward. He manifested all the symptoms of a febrile affection of the brain, and though he was already deprived of his reason and of almost all his sensitive faculties, yet he evinced the most unequivocal signs of nostalgia, for during the delirium with which he had been attacked, he incessantly talked about his country.\* Rubefacients were applied to the feet and legs, and every other remedy indicated in such cases, was employed. The slight delirium which he had displayed at first, was succeeded presently by lethargic drowsiness which continued increasing to the period of his death; all the *animal* and *sensitive* functions declined rapidly, and the patient sunk into a state of absolute prostration; his limbs were palsied, his hands were crossed over the abdomen and his eyes shut. Such was his situation, when I was desired to visit him in the fever ward; the disease was then of six days standing. Loud calls, slight shocks and shakings were alike insufficient to rouse him from this state of lethargy. The eye-lids, when separated with the finger, exhibited the eyes fixed, dull and inanimate; the pupils were dilated, and the rays of the sun, as well as slight frictions over the eye-lids, made no impression whatever upon them. Desirous to ascertain the state of animal sensibility, which I had reason to believe entirely extinct, I applied

\* The exciting causes of this disease could not be ascertained. It is not unlikely that the patient may have tried to drown his disappointment and weakness by means of spirituous liquors, in the use of which all soldiers, especially at Paris, are in the habit of indulging themselves.

lighted matches to different parts of the body. These repeated burns produced not the least sensation in D., nor could I perceive the slightest motion in any of the burnt parts; the beatings of the heart and the pulse which was vermicular and barely perceptible, experienced no further change.

With the intention to make a decided impression upon the solar plexus, I placed some dry cups over the epigastrium. To my great surprise they produced a simultaneous action of elevation in the upper eye-lids, of contraction of the iris of both sides, and of circumduction in the ball of the eyes. These motions I caused to be repeated at will several times by the same means; and they convinced me still more that the consciousness of this individual could no longer appreciate any of these sensations, and that his vision was gone, for he showed not the least mark of pain during the application of the burning match or of the cups, heated as they were by spirits of wine set on fire. The same application to the extremities did not produce any visible impression, whilst its repetition on the epigastrium a second time induced a sensible contraction, particularly in the iris of both sides, which continued even after death, for on examining the corpse, the pupils were still contracted.

At length, after an interval of a purely vegetating existence, and after a condition of almost complete dissolution, the last breath of life, which had intrenched itself, as it were, in the internal organs, fled, and the patient expired on the seventh day from the commencement of his illness. Thirty-six hours after death I examined his body, by beginning with the splanchnic cavities. I found the abdomen and the serous covering of the small intestines, that of the ileum in particular, in a state of chronic inflammatory engorgement; small whitish granulations and points of adhesion between the intestinal convolutions were visible upon them; the mucous membrane of the alimentary canal was white throughout its whole extent; the bladder was filled with urine of a dark red; the liver and the spleen were turgid with black and fluid blood. The lungs were healthy; the two laminæ of the pleura adhered to each

other by membranous filaments of old formation; the heart and its dependencies were in the usual condition.

The scull-cap, being sawed and removed, appeared to me, considering the proportions of the subject, to present an extraordinary and unnatural excavation. The sutures, digitations and furrows usually to be observed there, were entirely effaced, and the bones of this as well as of every part of the scull were greatly diminished in thickness. The dura mater presented no morbid appearance, but, after having made an incision into it and divided its folds, I found the arachnoid membrane covered with purulent albuminous patches, some of which penetrated through the pia mater into the brain itself; they were more especially perceptible on the internal margins of the hemispheres and along the whole superior surface of the anterior lobes. A deposition of purulent matter existed at the base of the left lobe of the cerebellum, which was by one-sixth larger than the right. The lateral ventricles contained a pretty large quantity of serum, which even spread into the spinal canal. The whole substance of the brain was in a state of expansion and compactness far more decidedly marked than is ordinarily observed in inflammations of this organ. The expansion of the encephalon had attained to such a degree that from its periphery it protruded into all the cavities of the cranium, while it was depressed in all the projecting places of the scull. Thus, for example, the anterior extremities of both hemispheres were flattened and depressed upon the eminences formed by the orbits, so as to present a slope of a depth and shape corresponding to these bony projections, while the internal margins of both these lobes had sunk into both ethmoidal fossæ, being separated by the crista galli.

This post mortem examination furnishes an incontestable proof that in nostalgia, as well as during a state of exaltation of all the sombre affections of the soul, the brain in reality undergoes, as I have already observed in the progress of this article, an actual expansion, or abnormal exuberance, which is the result of the erectility of its substances, occasioned by onanism, and, generally speaking, by every other cause of ex-

citement.\* There is, therefore, some truth in the remark of those who are attacked by this disease when they say that their scull is ready to burst.

I believe that I have saved several nostalgic patients by the exhibition of the remedies above indicated, and administered according to the modifications suggested by the idiosyncrasy of the individual and by the duration of the disease: steady exercise, but especially the instantaneous departure of the patients for the country to which they long to return, greatly promote their recovery. Vigorous, a professor of Montpellier, cured all the English who came to consult him for the *spleen*, by directing them to make long and uninterrupted excursions on foot, on horseback, or by travelling post, according to their circumstances. In addition to which he prescribed for them some harmless mixtures, variously coloured, under the pretext of their being compound medicines and of a high price. Journeys to watering places in picturesque situations have been recommended by the older physicians, as well as by those of our own times, for the purpose of dissipating melancholy and preventing nostalgia.

A lymphatic idiosyncrasy already alluded to, an unaccustomed sojourn in cold and moist climates, slavery or imprisonment,† indolence, excess in venery or onanism are, generally speaking, the causes of nostalgia and of every other species of melancholy insanity, the effects of which centre in the brain. The periods of the sudden rise of the barometer have appeared to us best calculated for the development of

\* A similar phenomenon may be observed in cases of hernia cerebri, which occasionally occur through the openings made into the cranium during the operation of trepanning. This might be called *spontaneous acute cerebritis* in the first case, and *accidental cerebritis* in the second. This affection is analogous to enteritis which, in the instance of hernia, happens in the strangulated portion of the intestine.

† It is more especially owing to confinement in prisons that nostalgia and so many other mental diseases derive their origin. All the prisoners should be compelled to do some kind of work, for which they should be compensated (as is done in the United States). From this proceeding the double advantage would arise to improve their manners and to obviate the effects of a mischievous idleness.

these diseases. In order to prevent this kind of cerebral affection, particularly in those soldiers who join their corps, it will be necessary, therefore, to indulge these individuals thus predisposed only in the repose necessary for the reparation of their strength, exhausted during the day, and to vary their occupations, by turning both their labours and their recreations to their own advantage as well as to that of the community. Thus, after the customary military exercises, it would be well to compel them to go through a course of gymnastics and some method of useful instruction. It is in this respect particularly that mutual instruction, as established amongst the troops of the line, proves advantageous to the soldiers themselves and to the state likewise. Martial music, which should be made during meals and between the hours of recreation, would contribute considerably to enliven the spirits of the soldier and to divert the moody and gloomy reflections to which the causes above enumerated so frequently give rise. By means of these precautions and the application of the above principles of hygiene, I have had the good fortune to preserve the crew of our frigate from nostalgia and every other serious disease, during the tedious cruise which I made in the Northern ocean in the years 1787 and 1788, in which we lost but one man in consequence of the hardships of a shipwreck. It should be the business of the paternal solicitude of the chief officers of each army-corps, assisted by the advice of the surgeon majors, to carry into effect the measures above mentioned for the purpose of preventing nostalgia, a disease which is the more serious in proportion to its insidious nature. But, if the authorities neglect to lay the talents and the experience of physicians under contribution, it will still be the duty of the latter to leave nothing untried to arrest the progress of this affection, as soon as it may appear, by obviating its effects, and hastening the cure of the patients.

With this object in view, and in the instance where nostalgia has positively manifested itself in an individual, I shall in its course point out the mode of treatment which has appeared to me to be the most judicious, together with the results which I have derived from it.

During the first stage, which is that of pyrexia, the blood-vessels of the head should be depleted by direct and derivative blood-lettings; the fluids of this part be condensed gradually by ablutions of the vertex with cold water or with ice, according to the indication; a revulsion be induced towards the depending parts, and the development of the functions of the internal organs be promoted, by means of emollient demi-baths, at a temperature of 25 to 26 degrees (Réaumur),\* by the application of cups to the hypochondria, epigastrium and dorsal regions, to be followed up by oleaginous camphorated embrocations. In addition to these, diluents and antispasmodics may be exhibited internally. Gymnastics, music and pretty steady exercise should also not be lost sight of.

Whenever the disorder shall have reached the second stage, which is that of collapse, the strength of the patient must be supported by mild stomachics. Dry alkaline frictions are to be made over the entire surface of the body; the application of moxas, or of slight cauteries about the base of the cranium should be had recourse to. The patient is to be put upon the use of tea-like infusions of cinchona, cascarilla and canella. He should be prevailed upon to submit to a change of climate, and above all, as much as may be practicable to exchange a moist and cold place of residence for a warm and salubrious country.

In the third stage, unless nature herself can induce a salutary crisis, art has but few resources left. At all events, however, the nostalgic patient should, during the whole career of this dangerous disease, be treated with much gentleness and suavity.

In proof of these views, and in order to render them yet more intelligible, I propose to give a summary of the cases of several individuals whom I have successfully treated.

The first, John Barbier, aged 25 years, a private of the first regiment of cuirassiers of the royal guard, had received a slight contusion of the head and exhibited all the symptoms of nostalgia, a few days after being admitted into the hospital

\* Equal to about 99 to 91 degrees of Fahrenheit's thermometer. *Transl.*

(which happened in the middle of January 1820, at a period when the barometer had suddenly risen from 27 inches 2 lines to 28 inches 4 lines). From what I could collect from his comrades, the wish which this soldier had entertained for some time to return to his native land, and the recent concussion of the head, may be considered as the incidental causes of the disease. The symptoms rapidly travelled to a frightful height and the patient was in danger for several days; however, under the influence of the treatment, a sketch of which I have just given, these were quieted, and in less than three weeks he had recovered and was in fit condition to resume his military duties; he would not even make use of a furlough of convalescence which I had caused to be made out for him. Blood-letting from the jugular vein, scarified cups to the back, ice to the head, and several moxas to both sides of the nucha, have appeared to me, in the treatment of this case, to be the remedies which were conducive to the cure of the patient.

The second, Theophilus Barbet, aged 23 years, was sent to the hospital on the 8th of January of the same year, on account of a fall which he had previously experienced. From the next day after his admission he displayed symptoms of nostalgia. His comrades informed me that during the whole night he had walked from one ward into another, talking incessantly of his country and of his parents. In fact, I discovered in this man the symptoms of an incipient affection of the brain, accompanied by mental alienation and by disturbance of the sensitive functions. During the first two or three days I employed but few remedies; I had been persuaded to believe that a furlough of convalescence which I had promised him, would quiet him; but the symptoms having become aggravated since, and after having employed part of the night in running about through several wards, he cleared the walls of the garden and disappeared. He endeavoured to gain the road leading to his native district, when he was met by some soldiers of his regiment, who conducted him back to the hospital, January 15th, at the hour of my visiting tour. He was restless and agitated; an unnatural heat might be observed on some part of the head; his eyes were injected; the pulse was vibrating and scarcely

returned fifty pulsations in a minute. To the questions directed to him he replied only by monosyllables, which frequently had no connexion whatever with the subject of the question. Neither did he express any desire for food or drink; he complained of no distress of any kind, and bore, without evincing the slightest sensation of pain, a depletion from the jugular vein, which I had ordered to be done on the spot. This depletion I directed to be followed up forthwith by the application of cupping-glasses to the regions already mentioned, and of ice to the head, while the patient was plunged into a demi-bath at a temperature of 25 degrees; finally he was put upon a diet of chicken broth and cooling mucilaginous drinks.

All the symptoms were pretty quickly subdued under the influence of this treatment, and I believed him to be in a convalescent state sufficiently safe to induce me to send him home with a discharge from the service which I daily expected to receive, when in the night of the 21st to the 22d of the same month (the barometer having risen to 28 inches 8 lines), new symptoms supervened, and after having taken during the night several turns through the hospital, with symptoms of somnambulism, he jumped a second time over the garden wall and betook himself to flight. I have since learnt that he had repaired to his place of nativity, where no doubt he must have regained his health.

In addition to the above cases, I shall only relate a summary of that of one Lewis Stobler, aged 21, a private of the first Swiss regiment of the guards. This young man, after having repeatedly told his comrades of his ardent desire to visit his parents at home in Switzerland, was suddenly seized in the middle of the night in the spring of 1819 with an attack of nostalgia, during which he precipitated himself from the window of the third story of the barracks, with the intention, as he subsequently confessed, to break a leg, in order to be discharged and sent back to his country. It may be surmised beforehand what must have been the result of a fall so violent, the principal effects of which centred in the right leg and in the pelvis. The shock sustained by the leg was attended by such a shat-

tering or destruction, that its amputation had been rendered indispensable; while that experienced by the pelvis and loins resulted in a complete luxation of the first lumbar upon the body of the last dorsal vertebra. The compression exerted in consequence of the displacement of the former instantaneously caused a total paralysis of the lower extremities, of the bladder and of the large intestines. The brain in its turn had sustained such a concussion that, notwithstanding a pretty considerable hemorrhage from the ears, the patient had been temporarily deprived of the powers of sensation, locomotion and intellect; in fine, he appeared to be in such imminent danger, that his dissolution was expected from one moment to another. We nevertheless lavished upon him every attention which his condition seemed to require, and having thus succeeded in recalling his vital powers, he was, after a year of uninterrupted care bestowed upon him, finally restored to health, the luxation of the vertebra, however, remaining with a few degrees lessening in the displacement of this bone, and being deprived withal of his right leg. At that period this young Swiss no longer felt the desire to return to his country; on the contrary, he signified a wish to be admitted into the royal hotel of the invalids, where he, being a foreigner, could not be received, and to his great sorrow he was sent back to Switzerland.

This observation, the very remarkable details of which will be more fully developed in another article, conveys the fullest conviction that nostalgia is exclusively seated in the brain, which in the present instance had been already inflamed when he threw himself from the window, and that the spontaneous hemorrhage from the ears at the moment of the fall, the blood-lettings and the amputation of the limb, all which were successively performed, while they re-established in the encephalon the equilibrium of all its functions, they at the same time extinguished in this soldier the settled and imperious necessity to return to his country.

*Of the Operation of Blood-letting from the Jugular Vein and Temporal Artery.*

Authors have scarcely said anything on the subject of this species of blood-letting, and nobody has, to my knowledge, pointed out any of the precautions necessary to be taken in order to perform this operation with safety and with that degree of success which ought to attend it; in fine, no physiological explanation of its effects has been as yet given of it, when employed for the purpose of relieving the sanguineous congestions of the head. With a view, then, of supplying this defect, we have considered it a useful labour to indulge in a few reflections on this operation, and on the great advantages to be derived from it in sanguineous apoplexies and in brain fevers.

Blood-letting from the jugular vein is a much more delicate operation than is generally supposed. Even when the vein is very distinct, its mobility and elasticity render it difficult to open it; very frequently it lies deeply concealed beneath the platysma myoides muscle, and occasionally it is altogether imperceptible. However, in almost every case it can be made to appear by pressing the thumb firmly upon its course between the clavicular attachment of the tendon of the sterno-cleido-mastoideus and the anterior margin of the trapezius muscle; in the next place the skin of the neck should be kept on the stretch by the finger of an assistant, below the angle of the jaw; after which the lancet must be plunged obliquely, from below upwards and outwards, into the middle of the vein, which is then to be raised up finally in the direction of the fleshy fibres of the platysma myoid muscle by which it is covered. Care should be taken also not to strike too perpendicularly with the point of the instrument, from an apprehension to transfix the double parietes of the vein; for besides the possibility of danger from wounding some of the nervous fibrillæ which are found underneath this vein, there is the liability of risk from the formation of a thrombus in the subjacent cellular texture which might be attended with disastrous consequences, such as inflammation and suppuration

of this texture and the passage of the purulent matter through the posterior opening of the vein into the interior of this vessel and from thence into the heart. Another not less serious accident is the passage of air with the globules of the blood through its anterior opening, during the operation, unless the precaution is adopted to exert a permanent and uninterrupted compression over the course of the vein below the orifice. This precaution is one of the most important to be taken in practising this species of depletion.

Now, since we have laid down the rules to be pursued in order to perform this small operation with perfect safety, we shall briefly mention the cases in which it is not only proper, but in which it can hardly be surrendered for venesection from the arms, the legs, or for the application of leeches.

It may be taken as a general rule that in all sanguineous congestions of the head, such as acute fevers of the brain, spontaneous sanguineous apoplexies, or those which may be occasioned by any pressure whatever upon the jugular vessels, this kind of blood-letting is indispensable, and ought to be resorted to in the promptest possible manner. It cannot be relinquished for bleeding from the veins of the extremities, because the first effect of sanguineous congestion in the brain is an eccentric or concentric pressure (according to the seat of the congestion), upon the origin of the nerves arising from that organ, from whence results a proportionate paralysis of the lungs, the stomach and the extensor muscles of the head, which, by virtue of its own gravitation, is inclined to the bent position the more easily as its axis does not conform to that of the first cervical vertebra which is its proper fulcrum. Thus, this involuntary and permanent flexion will soon be followed by an approximation or contact of the parietes of the jugular vein at its origin in the gulf of Louver, the only communication of the vessels with black blood of the interior of the cranium with the remainder of the circulatory system; whereby the free circulation of the blood of the sinuses of the dura mater in this vein, and from thence to the heart, becomes suspended. This fluid, which therefore must flow back into the sinuses and gradually into the cerebral veins, increases the

congestion of course, and aggravates the evil. Other methods of depletion, while on one side they reduce the vital powers of the system, on the other are instrumental in augmenting the consequences of paralysis which have been spoken of, whereby the obliteration of the parietes of the jugular vein will, therefore, become even more decidedly marked, whereas the opening of the latter vessel empties the meningeal sinuses in a direct manner, and thus unloads at once the deep seated vessels of the brain. The congestion will then terminate by resolution, as far as it may be susceptible, and the encephalic nerves, being no longer compressed at their origin, will again transmit the electric stimulus to the enfeebled organs, the functions of which will immediately be re-established. This internal resolution may in the next place be accelerated by repeated applications of scarified cups to the nape of the neck and to both sides of the spine, by the employment of sedatives, such as ice put upon the head, and of revulsives to the base of the cranium. A cooling and mucilaginous diet will also materially assist this mode of treatment.

#### *Of the Operation for Arteriotomy.*

The opening of the temporal artery is indicated in all acute phlegmasiae of the epicranial membranes (aponeurotic and muscular expansions), in that inflammatory condition supervening after injuries of the head, and in meningeal inflammations, provided they can be distinguished from genuine affections of the brain. In order to perform this operation, the lancet is to be used in preference to the bistoury, inasmuch as the former will merely divide the anterior or external coats of the artery, so that the divided extremities of the vessel cannot retract again, and the blood continues to flow without interruption, yielding thus any quantity which it may be desirable to obtain. Besides the inconvenience of dividing the whole caliber of the tube, the bistoury may, moreover, imperfectly divide some of the filaments of the facial nerve, the lesion of which might be attended by tic douloureux or neuralgia of the face. The flow of blood may be arrested afterwards by means of the nodose bandage (*noeud d'emballeur*) and the dressing

should be allowed to remain, till the small orifice of the wound shall be cicatrized entirely. It frequently happens that the blood continues to circulate in the same wounded branch of the artery, the orifice of which has become closed, in the same way as that of one of the veins of the arm in a case of ordinary venesection. If the vessel has been cut completely across, both ends then retract and the hemorrhage stops, in which case the circulation afterwards will be interrupted in this arterial branch, which is obliterated and disappears. If, however, in the first instance, the slight pressure on the wounded artery be too soon removed, although the orifice should be cicatrized, a small encysted aneurism is then frequently formed beneath this cicatrix, which can be made promptly to disappear by renewed and isolated compression. (See the article *Aneurism*, Clin. Chirurg. Vol. III.)

*Of the Nervous System of Relation.*

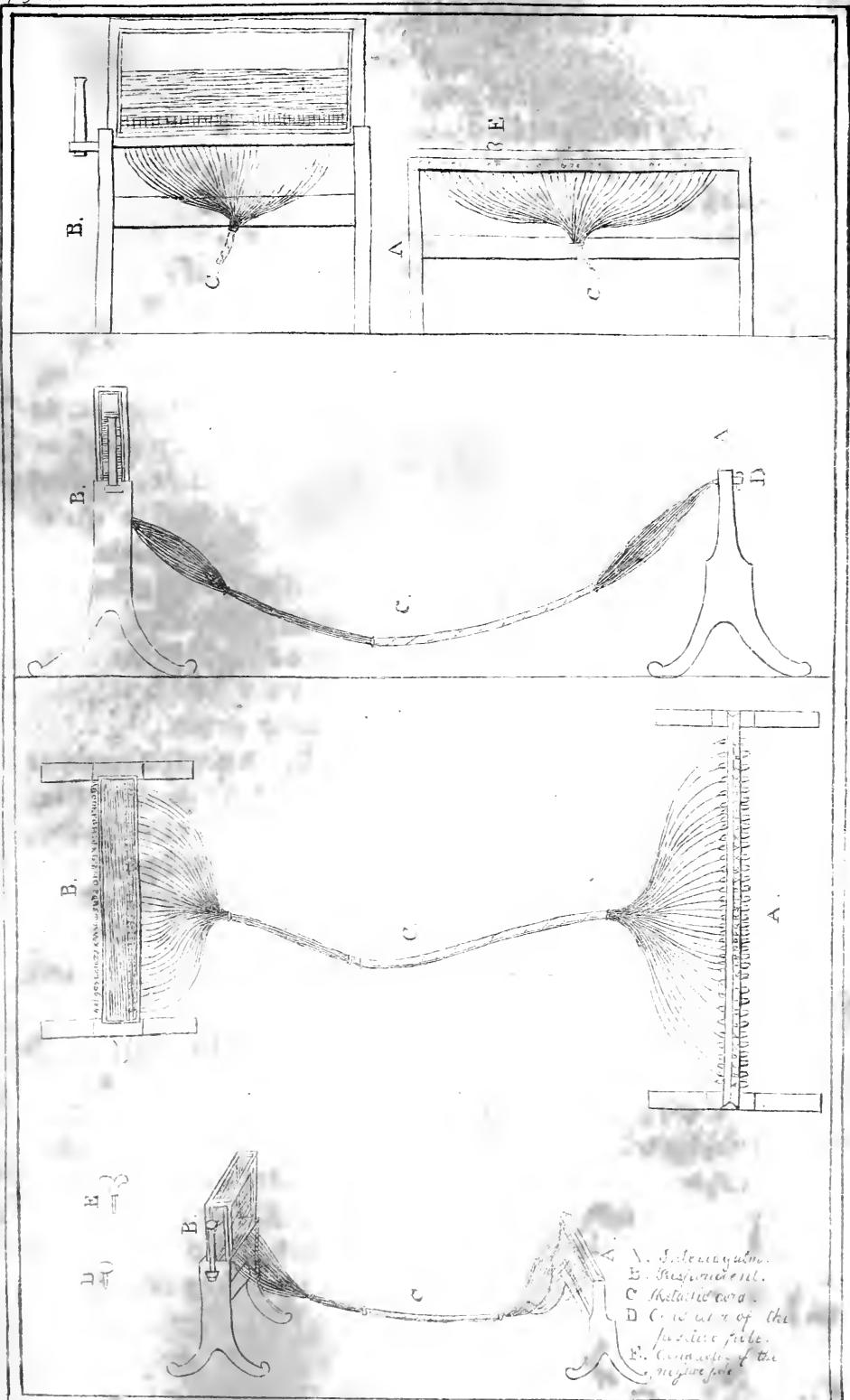
In order to form a correct idea of what we have said in the preceding articles, relative to the distinct origin, in different parts of the encephalon, of the nervous filaments of which the nervous system of relation consists, we intend to republish on this occasion the memoir which we wrote at another time on the subject of the origin of these nervous roots, and of the particular functions over which each appears to preside, by describing, for the purpose of a comparison with our own theory, the mechanism of an electric telegraph which has been invented by the celebrated Sœmmering. This telegraph, which on my journey to Munich I received from the hands of the author himself, had been laid before the Institute of France, at the commencement of the year 1810; but the academy having made no report on this instrument, I returned it to the inventor, not without the precaution, however, of having it copied. We shall, therefore, begin by describing this instrument as briefly as possible, and proceed afterwards to the parallel which we have drawn with it of the origin, the course and the distribution of the nervous system of relation.

This telegraph consists of a fixed number of metallic wires (there may be thirty-five), establishing a communication be-

tween the two principal pieces of the instrument, which are denominated the *interrogator* and the *respondent*. There are on the interrogator a range of metallic cross-bars placed horizontally and at equal distances from one another, which correspond to particular signs (the letters of the alphabet). Each of these bars presents at one of its extremities a hole large enough to admit the points of two electrical conductors, and another considerably smaller for the passage of the metallic wire. These wires, separated at first at the points of their insertion, and isolated in their whole extent by threads of silk, afterwards approximate each other and come in juxta-position, so as to form a common cord so tightly twined as to appear to be of a simple or unique texture. These wires run parallel, or intersect one another, in their course, and experience various inflections; and after having travelled over a certain space, they again separate, diverge and anastomose or articulate with some points of gold which are placed vertically in a glass vase of the shape of an oblong square, forming thus the largest part of the respondent. The signs which we noticed at the insertion of the wires, are repeated opposite the points of gold. The vase must be filled with pure and clear water.

When some electric fluid produced by an electric machine or the Voltaic pile is transmitted by means of the conductors coming from the two poles of this column, the electric fluid travels without any impediment along the whole passage of each metallic wire, without passing over to those which are contiguous to it, notwithstanding their interlacing or intersecting one another. This fluid then goes to the corresponding gold point. The electricity issuing from the negative pole instantly disengages hydrogen (from the water in the jar), while that proceeding from the positive pole liberates oxygen. Here these gases become perceptible by the accumulation of air-bubbles which creep upon the points of gold and rise in a jet without the least obstacle to the surface of the water, where they may be received with gasometers. In this way it is easy to determine the quantity and the nature of the gases disengaged in a given space of time. Such are nearly all the chief

page 244. Sommering's Electrical Telegraph.



A. Inducator.  
 B. Resistor.  
 C. Metalic cord.  
 D. Cover of the  
 insulating tube.  
 E. Contact of the  
 magnetic pole



characteristics and the principal results of Doctor Söemmering's electrical telegraph.

Now, the nervous system, especially that of relation, appears to be distributed upon a similar plan, and presents in its functions analogous phenomena. Those nervous filaments, for example, which derive their origin in this or that part of the brain, of the medulla oblongata or of the spinal marrow, do nevertheless not blend their functions with those of other filaments which arise below, or higher up, or at a greater distance. And although they may unite, in the formation of nervous ramifications, branches, or trunks, yet they are isolated by their particular neurileme and glued to one another.

Several great anatomists have already observed the isolation of the nervous fibrillæ which compose the large cords of nerves, their branches and their ramifications, whether they intersect each other, or run parallel and without becoming at all confounded. Every body has it in his power to verify the experiments of these anatomists. If, for instance, somebody will take the trouble of dissecting somewhat carefully the nervous filaments of the sciatic or of the median nerve, he may, indeed, trace these filaments very distinctly. They are parallel to their origin so long as the nervous trunk gives off no branches, or suffers no inflexion. When this happens, these filaments cross each other in such a way that the anterior become posterior and vice versa; at last they separate by diverging, form branches, twigs, ramifications, and go to their respective destination. Some supply the muscles, others the skin, the cellular tissue, &c. but in such a manner that each of these filaments may fulfil some distinct function, according to its origin from this or that part of the medullary substance, the medulla oblongata or the spinal marrow.

The two nervous cords of the seventh pair, it seems to me, furnish a striking example of the truth or probability of my assertion. The portio mollis or acoustic nerve arises from the anterior wall of the fourth ventricle of the brain by two or more small cords or fibrillæ, whilst the portio dura or facial nerve takes its origin far below and more behind the first in the groove which separates the cerebral or annular pro-

tuberance from the medulla oblongata at the summit of the eminentia olivares. The former of these, more elevated towards the positive pole of the medulla oblongata than the other, is destined to form the organ of hearing; the latter, on the contrary, which is nearer to the negative pole, is destined to endow the muscles of the face with the power of motion, and the skin and certain glandular structures of that part with feeling or sensibility. The same disposition holds no doubt with regard to the lingual nerves, some of which are subservient to taste and others to speech; they certainly have a distinct origin and stand in an analogous relationship.

The branches which the median nerve, for example, sends to the muscles of the arm, fore-arm and the hand, for the purpose of endowing them with motion, have surely not the same origin in the spinal marrow as those which it furnishes to the skin in order to impart sensation to it; and for the same reasons the fluid, which passes through these different elementary nerves, must experience corresponding modifications: and hence proceed the various sensations with their different results.

The neurileme stands in the same relation to the nervous substance or to the real elementary nerve, in which the thread of silk stands to each metallic wire of the telegraph of Sœmmering; the common membranous sheath surrounding the nervous trunks represents the silk ribbon in which the metallic cord of the telegraph is enveloped; thus this instrument might perhaps be styled with greater propriety the *simulacrum nervorum*.

We have moreover reason to believe that the intensity and the force of excitement of the nervous fluid are in the ratio of the pole of the encephalon or animal electromotor. It is not unlikely that there are as many galvanic columns in the brain, as there are distinct portions in both the medulla oblongata and spinal marrow. They are composed, as in the metallic pile, of different substances, one placed over the other, which consist chiefly of the grey or cineritious substance, and of the white medullary or nervous substance. Vascular membranes sometimes form the points of separation or the bonds of union between each other. They form piles or layers of various

thickness. The internal nervous commissures, so well described by Doctor Gall, may be considered as so many particular conductors which establish as many ways of communication between the piles, between the latter and the nerves themselves, or general conductors. These conductors always derive their origin from the white substance, as the metallic conductors come from the disks of zinc or silver. These two substances exist in every portion of the brain, from whence nerves arise at all; they are consequently to be met with in the medulla oblongata as well as in the spinal marrow.

In admitting the identity of the nervous fluid with the electrical fluid, as it seems to be confirmed by the experiments of Galvani, Volta, Ritter, Davy, and Scemmering, it would appear that this fluid is in the first instance concentrated on the piles of the encephalon, where it is carried by the arteries, or perhaps by some other external conductors, such as hair, &c. that this fluid variously modified, according to the points or animal piles which produce it, is afterwards transmitted and distributed to the different nerves of animal life in order to excite the phenomena peculiar to it. This fluid, after having undergone some modifications, communicates with the nerves of organic life; and the fluid which prevails in the latter is modified again or excited by ganglions which may be looked upon as so many small and independent brains.

All this proves that the intellectual and sensitive functions are executed by agents distinct from one another, by which different results are produced, although there may exist a communication and sympathy between the organs concerned. Thus, we shall suppose that the nerves which arise from the negative pole of such or such a pile give motive power to the muscles, as the conductors of a more powerful and more active principle. Specimens of it may be found, I think, in the pile of the medulla oblongata which has for its base the centre of the medullary substance of the brain. We perceive all the most delicate nerves of sensation arising from the superior part of the positive pole, which in the telegraphic instrument disengages oxygen, which is minus; such are the olfactory, the auditory, the optic nerves, &c.; whilst those which minister

to the functions requiring a greater degree of intensity, as those of the muscular tissue, take their origin from a more inferior part of the medulla oblongata, or in the direction of the negative pole, which, in the telegraph of Sœmmering, produces hydrogen which is in excess. And the same obtains in the two pyramids or columns of which the spinal marrow appears to be composed.

Here we are struck by a singular phenomenon which supports this assertion. The spinal nerve of *Willis* which anastomoses with the par vagum or eighth pair of nerves, and which is exclusively appropriated to the posterior muscles of the shoulder, arises exactly at the negative pole of the first part of the spinal marrow, or from its first pile, whilst the latter, which is appropriated to the internal and more delicate sensitive functions, arises from its positive pole, or from its superior part. I believe that the same arrangement prevails throughout all the other nerves of animal life, although their elementary fibres are apparently confounded in their trunks and identified between themselves.

If the celebrated Lionnet who has given an exact and minute anatomical description of a great many animalcules, such as the puceron, the common flea, the scarus, &c. had been charged with the dissection of these elementary nervous filaments, he would have traced their trunks to their real and distinct origin, as well as to their termination, and it is probable that we should now have been enabled to verify this surprising and beautiful analogy between the electrical operations made by means of the above cited instrument and the operations relative to the nerves of animal life. Similar researches, the pursuit of which belongs only to physiologists ex professo, would doubtless contribute to an explanation of many phenomena which are still wrapped in the veil of mystery.

The nerves of organic life enjoy another mode of existence, but as there is so great an analogy in their properties that, wherever they may be distributed, they produce effects of vitality or excitability almost alike; and that the modifications of these properties seem to reside in the ganglions; we shall

not, for the present, start any hypothesis at all on this system of nerves. I shall merely observe that the nervous fasciculi, proceeding from the two great sympathetic nerves, necessarily accompany the arterial trunks, the branches and ramifications to their most minute distribution into the substance of the parts, as has been already advanced by several great anatomists, such as Bichat, Chaussier, Ribes, &c.

At the shambles of armies, where I frequently made some experiments, I have had occasion to witness two of these nerves in the foetuses of cows accompanying the umbilical arteries into the ramifications of the placenta, and others following the course of the subclavian and crural arteries as far as their first branches; nor is it doubtful any longer that they extend even to their farthest ramifications. I believe, moreover, that these great sympathetic nerves propagate organic life into the osseous membranes, the articular ligaments and the synovial membranes; for the slightest injury of these parts by some cause operating for a certain length of time, violently attacks the organic properties of the limb, and immediately disturbs the functions of the internal organs.

## OF THE INJURIES OF SOME PARTS OF THE FACE.

### 1. *Of Lesions of the Ear.*

Solutions of continuity of the external ear vary according to the extent, the shape and the nature of the causes which produced them. Incised wounds or divisions made by sharp instruments may be limited to a portion of the ear, or they may include almost the whole of its extent; for when it has been cut off entirely and separated from the head, there is nothing to be done in order to restore it to its primitive relations. Every attempt to accomplish such an object will prove abortive, for its adhesion to the parts from which it may have been completely detached will never again take place. In every other case, and be the point never so little by which the divided flap adheres to the remainder of the ear or to the margin of the meatus auditorius, immediate re-union is at once indicated, and should be done by means of needles (of which we have spoken in the article on *Wounds*, see pages 4 and 5), and by having recourse to the interrupted suture. The cartilages, forming the external ear, as we have already stated, should be included within the stitches of the suture; no unpleasant symptom will result from it, and the suture will only be the more exact and firm. Care should be taken to fill up with charpie the intermediate spaces of the sinuosities of the ear and the channel by which it is separated from the temple. The dressing may be completed by a common retaining bandage, which, as far as may be expedient, should not be disturbed until the very moment of complete cicatrization. Such then is the operative process or the mode of dressing

which has appeared to us to be the best adapted for simple or incised wounds of the ear.

But, if these divisions are unequal or jagged, which necessarily happens when the instrument itself, which has caused the solution of continuity, presents inequalities in the acting surface, then the indication is, of course, different. In that case, it is necessary to use a pair of curved scissors and cut the edges of the division smooth, in order thus better to bring them in close apposition and to produce an uniform cicatrix.

This kind of wounds is frequently the result of bites from men or from animals. It is, indeed, no rare occurrence to witness violent scuffles amongst individuals of the human species terminate by bites into the ears, the chin or the lips; I have seen that repeatedly even among soldiers; but it is from motives of self-love that such persons carefully endeavour to hide this cause as well as every vestige of its effects; for of all weapons which man may make use of for the purpose of avenging some insult, this doubtless is the most ignoble. The knowledge of this circumstance ought to put the medical jurist on his guard, lest he might suffer himself to be misled by false statements or by the interest of the wounded man. In this way I was enabled to clear up the proofs advanced in support of pretensions to certain titles or rewards which on some occasion had been claimed by a military man, who stated that he had been wounded by the hands of a stranger armed with his own sword, while the truth of the matter was that his ear had been bitten off by the teeth of some man or woman. The well marked denticulated notches displayed on the borders of M.'s wound, which extended transversely from before backwards over one half of the external ear, left not the least doubt on my mind as to the nature and shape of the offending cause. My substantiated report destroyed the illusion and put a stop to an investigation which in all probability would have compromised a great many innocent persons.

After having made my report on the state of the wounded Marie, I proceeded to dress his wounds, the most serious of which was that of the ear. I cut out the denticulated edges

with a pair of curved scissors, and reunited them afterwards by means of five stitches of the interrupted suture; the remainder of the dressing was made on the principles above mentioned, and was not taken off until the ninth day, when the reunion and cicatrix of the wound were completed. The knots of the ligature were cut off, and the ear, when measured and compared to that of the sound side, presented a diminution of about three lines,—the result of the resection of the edges of the wound. In other respects the shape and arrangement of the concha of the ear had been preserved entire.

The application of the principle which we have advocated for jagged or lacerated wounds of the ear, is equally suited to gun-shot wounds of this part; or in other words, it will be proper to convert, by means of resection, uneven wounds into simple ones, and to reunite them afterwards by the measures best adapted to the latter.

In all injuries of the meatus auditorius, particularly when accompanied with loss of substance, the attention of the surgeon should be directed to prevent the agglutination of the parietes and the obliteration of the meatus. One instance of such an accident occurred to a soldier who, during the last siege of Paris, had been wounded by a ball, in consequence of which the meatus auditorius of the right ear had been grazed or notched. This man spent several months at (the hospital of) Val-de-Grâce, where being treated for his wound, he lost, according to his own statement, several small pieces of the meatus itself, besides all the small bones of the ear. When I had an opportunity to see him, there was a cicatrix observable at the auditory region of the right ear, involving the total loss of the two eminences, denominated *tragus* and *anti-tragus*. The meatus was hermetically closed by the cutaneous pellicle which contributed to the formation of the cicatrix, which in itself was very small, elastic and of exquisite sensibility. The lateral margins of the concha were approximating each other, and the remainder of the external ear slightly inclining forwards, whilst the kind of covering without aperture, to which we have alluded, was depressed towards the bottom of

the meatus, where it appeared to us closely to approximate the cavity of the tympanum.

But a surprising circumstance was the fact, that this soldier, after we had taken the precaution of hermetically closing the right ear, could still hear most distinctly, even what was spoken in a low voice, with the ear of the right or affected side, although its meatus was completely closed by the prolongation of the dermoid cicatrix forming the covering (*l'opercule*). Nature no doubt had modified and moulded it in such a way as to replace the membrana tympani which had been destroyed by the effects of the gun-shot wound. In other respects I must let physiologists explain this singular piece of mechanism, which greatly enlisted the attention of the members of the philomathic society to whom this soldier had been presented in one of their meetings, during the winter of 1815 to 1816.

It often happens that dossils of cotton are forcibly and carelessly pushed into the meatus auditorius, so that this substance sinks deeply into that cavity, coils itself up there, and contracts so much as to disappear entirely; we have found them repeatedly at the very bottom of the ear. From this circumstance results a new cause of deafness which the individual never suspects; and he keeps afterwards this foreign body the longer, as it is scarcely visible, and moreover covered with cerumen. It may, however, be discovered by separating the parietes of the meatus with a pair of forceps, with which it may be seized afterwards, when its extraction is as easy as it can be rendered expeditious.

A young non-commissioned officer of the guards came to our hospital complaining of pain in the ear from which he had suffered for several years. It was kept up, so he told us, by the presence of a milk-tooth which he had himself put into the meatus of the right ear, while at play with his school-fellows. This tooth was lodged deeply in the meatus, where it touched upon the tympanum, so that by the most minute examination a small spot could be perceived only with difficulty. I, therefore, had a small pair of forceps made adapted to the periphery of the meatus, and by these means I succeeded, not without

some trouble, in the extraction of the foreign substance. The young man soon got well again and left the hospital a few days afterwards.

There is yet another cause of deafness which appears to have escaped the observation of those who have made this disorder their particular study. This is a species of mal-formation which supervenes at an age more or less advanced, or perhaps after some accident, and which operates upon the parietes of the auditory passage. In persons, for example, who in early life lose the molar teeth of one or the other maxilla, there will result from it a gradual displacement, upwards and backwards, of the condyles of the lower jaw-bone, which sink into the glenoid cavities of the temporal bones, so as to become lodged at the bottom of these articular cavities, beyond the glenoidal fissure (*la scissure de Glaser*) and before the meatus externus, the parietes of which will then be depressed in the same direction; the auditory passage is gradually obliterated, or undergoes such an alteration that the rays of sound can no longer reach the tympanum, from whence results deafness. Although collected by the tortuous folds of the concha, these rays concentrate themselves merely in the oblique and deep-seated fossa which may be observed before the orifice of this passage and at the base of the lobus. Under such circumstances the perception of sound by the internal ear cannot take place; the derangement of this canal produced by the pressure which the condyles of the jaw exert upon its parietes, in proportion to the change of relation, induced by the loss of all or of the greater part of the molar teeth, must therefore be looked upon as the immediate cause of this malformation.

The lymphatic glands in the vicinity of these passages, whenever they become engorged, may be the cause of a similar imperfection and of deafness; we have noticed this repeatedly in persons attacked with scrofula.

Ill-shaped cicatrices resulting from wounds of the meatus may be attended by the same consequences. In order to preserve the integrity of the auditory faculties, it is therefore of great moment, when such wounds are about to cicatrize, to be

careful of the preservation of the caliber and of the natural or normal direction of the meatus auditorius.

In order to recognise the deformity of which we are speaking, it will suffice to compare the connexion between the sinuosities of the concha and their reunion at the bottom of their cone with the orifice of the meatus auditorius, and to examine this passage well, so as to be sure at the same time that it contains no foreign substance capable of opposing the unimpeded entrance of the rays of sound.

In case of an unnatural deviation, induced by some of the above enumerated causes, it will be readily understood that the want of proper connexion between the orifice of the external meatus and the inferior extremity of the concha impedes the entrance into the internal ear, of the sounds which the concha had collected at the margin of that orifice, where they afterwards become lost in part or entirely, according to the extent of the deviation of the meatus; and that the degree of deafness will, of course, be in the same proportion.

Any organic lesion of this kind may be ascertained by means of a small trumpet, which can be made, on the spot, out of a playing card. Armed with this instrument the perception of sounds goes on as usual, so that this experiment will suggest to the physician the indication which he has to fulfil. This indication then consists in causing to disappear, with the aid of an acoustic trumpet, the obstacles which the rays of sound meet with in their career through the sinuosities of the external ear to the meatus. But the greatest difficulty in the application of this remedy is its adaptation to the ear, without having recourse to an external spring and without the individual being under the necessity of holding the trumpet with his hand, which is fraught with great inconvenience, the most irksome of which, no doubt, is to expose his infirmity to public observation.

It has, therefore, been necessary to invent a trumpet which should possess the qualification of collecting and of transmitting directly to the auditory passage the rays of sound which strike upon the external ear, and in the next place to contrive a plan for keeping this trumpet in its place without subjecting

the person to the least restraint, or to the effects of a mechanical apparatus.

The trials which I had at first made with metallic trumpets did not at all justify, by the result, my expectation from them. The contact of these bodies with the internal membrane of the meatus auditorius caused a sensation extremely uncomfortable to the individual, which was increased by the rise of the thermometer, or near some place of artificial heat, inasmuch as this instrument, being an excellent conductor of caloric, became heated in the same proportion. I then conceived the idea of getting trumpets made of gum elastic, contracted in such a manner that their margin should be in contact with the folds of the anti-helix, tragus and anti-tragus of the ear, and that it should be kept in this position, without any external fastening or spring, merely by the expansion of the gum, when under the influence of the heat evolved in the interior of the meatus auditorius. I found it necessary, besides, to give to these trumpets a somewhat inclined conical form, and to cover their internal surface with a coat of imperishable varnish of flesh colour. The Sieur Laserre (a skilful manufacturer of gum elastic instruments at Paris) has succeeded in constructing this species of instrument, after the pattern I had given him for it; after which I tried it, with complete success, for the first time in the person of M. de P. This individual, about 65 years of age, had been for the last fifteen years in a state of complete deafness. It was quite evident that in his case his deafness had been occasioned by the loss of the greater portion of the molar teeth of the corresponding side of the jaw bones in which the damp and marshy climate of Belgium had induced a necrosis: the incisor and canine teeth which had not been destroyed by caries, had been worn in consequence of the more immediate friction and of the upper and lower maxillæ riding upon one another. The inferior maxilla had been drawn upwards and backwards by degrees, and its condyles had, gradually, and in the same direction, depressed the inferior and anterior parietes of the meatus externus of both ears, so that their orifice stood no longer in the proper relation to the extremity of the concha of the ear: it

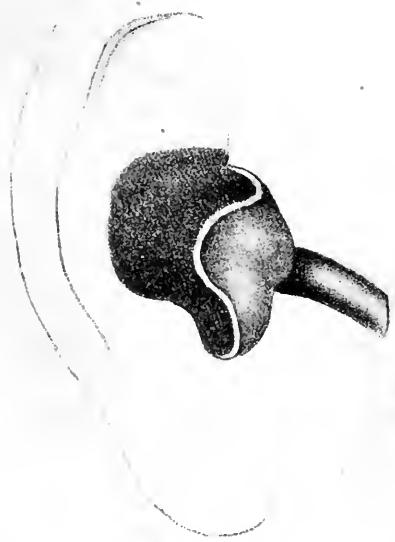
*Ear-trumpets.*

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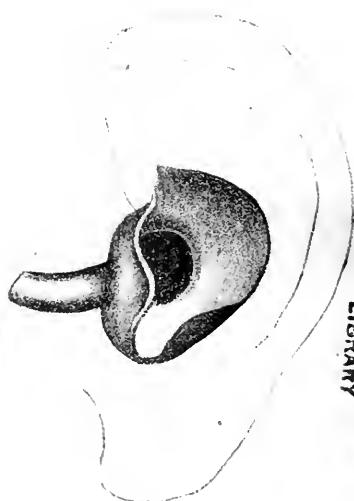
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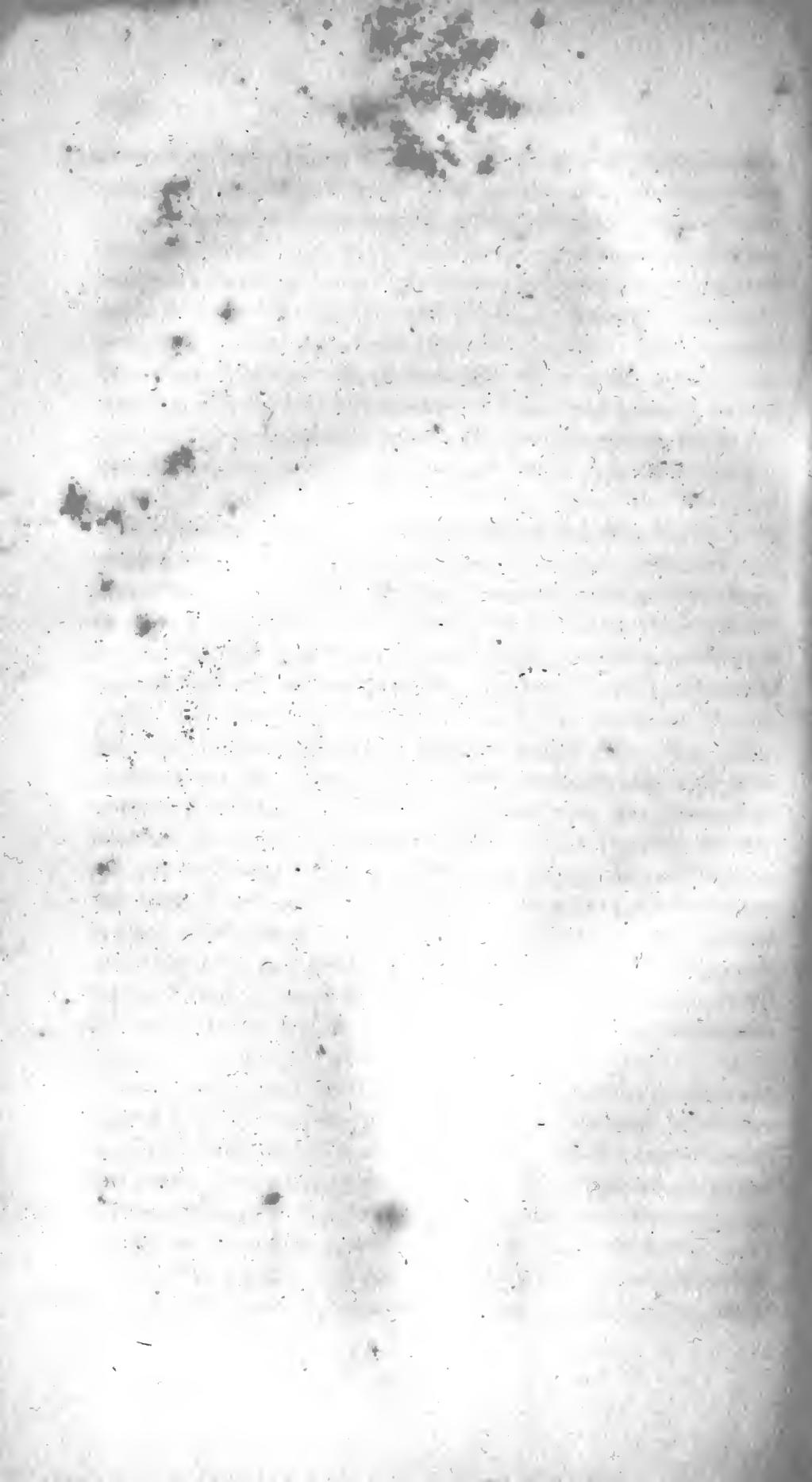


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was, on the contrary, in the fossa navicularis which is situated before the meatus that the rays of sound were lost, and that their being gathered upon the tympanum was frustrated.

Such was the cause of deafness of M. de P. Small trumpets constructed of gum elastic, painted and varnished, remedied this defect completely, and restored to him his auditive functions, so that he could now hear most distinctly all that was spoken near him in the usual tone of conversation, whilst without them he never could understand a single word, except by crying out loudly into the funnel of his ear.

This cause of deafness is no doubt much more common than is generally suspected, and I have reason to believe will often be found to prevail in invalids wounded on the jaw bones. The following fact confirms this notion in some measure, and as the person had been dressed on the field of battle by myself, and as I was enabled afterwards to conduct the treatment myself for a long time, which his wound required, I had an opportunity to prove all my conjectures on the modus operandi of this cause.

M. Schmidt, a lieutenant of the first regiment of mounted grenadiers of the guard, aged 48 years, had, on June 18th, 1815, been struck on the left cheek by a grape-shot in such a manner that the biscayan, after having disorganized the left commissure of the lips, lacerated the corresponding portion of the tongue and a portion of the soft parts of the mouth, had, besides all the molar teeth, carried off also the alveolar margin of the upper maxillary bone and that of the jaw, and shattered the coronoid process of the latter, and finally passed through the parotid gland, and that portion of the integuments by which it is covered. As this wound was of a very serious and complicated nature, I was compelled to dress the wounded officer in the mêlée almost of the disastrous battle of Mont-Saint-Jean, where a few moments later I was myself severely wounded and taken prisoner. The wounds of the cheek and tongue were rendered simple by suitable incisions and excisions, and the edges of the wounded parietes of the mouth were drawn together by sutures; but the injury in the region of the parotid, having from time to time discharged numerous

fragments, remained a fistulous sore for a long time and was extremely difficult to heal. During the process of re-union and cicatrization of the soft and the solid parts, the condyle of the jaw of the same side had become drawn up and fallen backwards to such an extent that the inferior and anterior walls of the meatus externus had become so far depressed that the orifice of the meatus had been completely closed up, and that therefore this officer had lost his hearing entirely on that side: however, the functions of hearing were instantly restored by a trumpet introduced into the meatus auditorius (an experiment easily to be accomplished with a playing card).

When the trumpets are properly fixed, they are with difficulty distinguished from the concha of the ear. In order to accommodate the margin of their expanded surface to the folds of the ear exactly, it will be proper to cause a mould of the ear of the deaf person to be made, upon which the trumpet should be constructed, because the ears of every individual have a peculiar formation. They may be taken out in the evening, and be replaced in the morning, always taking care, if the person should have occasion for two trumpets, not to confound the instrument belonging to one ear with that of the other. When once fixed, they are immovable for the reasons already assigned. Besides, these newly invented acoustic trumpets might be used with the same advantage for every species of deafness which is supposed to be the result of asthenia of the membrana tympani. The precaution only should be taken not to leave the stem of the funnel (entonnoir) too long, lest it might come in contact with the membrane itself.

Some not less singular cures of certain cases of deafness, pronounced incurable, will be found also in my article on moxa. These cures have been more particularly accomplished by means of the *Egyptian* and *Chinese* moxas, prepared and applied with such modifications, as the nature of the affection, the sex and the age of the patients seemed to require.

We could, moreover, make some suggestions, not altogether useless, on the accidental perforation of the tympanum and its

results, as well as upon that which art, under certain circumstances, may have recourse to; but these kinds of lesions are described at full length in every classical work, or in the writings which treat exclusively on the diseases of the ear. We may, however, cursorily observe that the rupture of the tympanum, although it may be complete and occasioned by a powerful rush of air, or by the shock of some mechanical cause, is not invariably followed by incurable deafness. We have seen several individuals in whom this perforation had actually occurred, and who, nevertheless, after having been deprived, for a longer or shorter space of time, of their auditory faculties, recovered them entirely and as perfectly as they were before the occurrence of the accident. It is probable that nature in this instance causes in the progress of time the opening to heal, which, however simple, or complicated by loss of substance, had been made into the tympanum; it causes it to heal, we may suppose, by means of a concentric development of the small blood vessels which constitute the organic laminæ of this membrane, and it is, moreover, probable that these vessels, by subsequently anastomosing among themselves, form an uniform and accurate cicatrix which restores to this tympanum its appropriate qualifications. And these results are the more likely to occur, as the solutions of continuity which changed the serous or mucous tissues, promptly disappear under the influence of cicatrices, being so completely formed upon them that the smallest vestige of these solutions could afterwards be no longer perceived. This new organization will be still better understood when we consider that nature herself contrived to transfer the properties of the membrana tympani, entirely destroyed as it was, to that portion of the dermis, which, in one of the cases above referred to, formed the covering of the meatus auditorius externus.

We could relate several cases, corroborating the truth of these assertions; but we will restrict ourselves to the following fact. M. Mazelle, one of the captains of the 18th demi-brigade, being the first at the head of a company of grenadiers who scaled the tower of Saint-Jean-d'Acre, in Syria, where a breach had been made to force a passage into that place, had

been thrown down in consequence of the explosion of some Greek fire and other combustible materials, and was pitched into the moat of the tower. Besides other serious injuries which he sustained from so tremendous a fall from a height of upwards of thirty feet, he had both tympana broken, and was in an instant totally deprived of hearing. In this condition he remained for about ten or twelve years; nevertheless, after that period the functions of hearing gradually became restored, and he finally recovered that faculty to such a degree that he could resume and perform all the military duties of his particular military grade with the same precision as before the accident.

However, in a majority of cases, the perforation of the tympanum by means of a surgical instrument, instead of reinstating the auditory functions, as is the operator's intention, annihilates them completely; while in some instances and for the same reasons which we have stated above, they will in the course of time be restored of their own accord. Upon the whole, we believe it to be a difficult matter to show precisely and in any particular case the efficacy of such an operation.

Previously to our concluding this article, we shall indulge in one simple remark more on the perforation of the lobe of the ear for the purpose of suspending ear-rings by it. In the first place it is proper to perform this operation with a small gold needle, edged on both sides of its point, similar to that of the suture needle; but while the point of the needle is yet retained within the opening, we should be particular how we pass the wire of lead, which is to prepare it for the reception of the rings that are to be suspended, because a galvanic sensation is its immediate consequence, which attacks in a singular manner the nervous system of children or other delicate persons, and may possibly throw them into convulsions, of which we have seen two instances. It will, therefore, be much better to replace this needle by some metallic wire of very close texture and of the same material as the needle itself. With these precautions all the like accidents may be prevented.

*2. Of some Diseases of the Eyes.*

We shall in this article dwell on the changes of structure of both the auxiliary and essential parts of the visual organ, which, having exhibited singular phenomena, had fallen under our own personal notice; and we, moreover, reserve to ourselves the privilege of republishing in the description of the parts of this organ the remarks which we have made on the physiological anatomy of some amongst them.

In speaking of the solutions of continuity to which the auxiliary parts of the eye may become subject, we shall say one word only on those which destroy the integrity of the *eye-brows*. When the latter have been occasioned by pointed or cutting instruments, they may be accompanied by lesion of some of the branches of the trochlearis nerve which are furnished by the ophthalmic of Willis. This circumstance may give rise to pretty serious nervous symptoms, suspend the functions of vision for a longer or shorter time, or change them in proportion to the extent of the injury. When this is the case, the injured nerves should be clearly divided and the wound itself be converted, as far as may be expedient, into a simple solution of continuity. The nervous symptoms will then instantly cease, and vision, which may have been suspended or weakened, will be restored with equal despatch. A few examples of the efficacy of this mode of dressing will have been read in the article on *Tetanus*.

If, however, some branch of the supra-orbital arteries has been divided, it will be best, after separating all the nervous filaments from them, immediately to apply a ligature, because mere pressure is often insufficient to stop the hemorrhage. But, in no instance whatever, should the eye-brows be shaved, inasmuch as these hairy productions, with respect to their growth, remain stationary until old age, and that consequently months and years will be required, ere nature can entirely reproduce the deficiency. If the division of the eye-brows is deep and extensive, it will be useful and almost indispensable to have recourse to a few stitches of the interrupted suture, so

as to preserve the precise consolidation of these parts, and the original relation of the hair which grows upon them.

The *eye-lids* may be divided or lacerated, singly or both at once, in their whole diameter and in different directions, either by side arms, or by projectiles of greater or lesser size, or by some other offending cause, in such a manner that the solutions of continuity resulting from the action of these various causes bear a relative aspect. In every such case, immediate reunion is the first indication, and if the solution of continuity be regular and uniform, it may be accomplished without any further preparatory measure. Where, however, their edges should appear to have been abraded, unequal or notched, they should previously be cut smooth with a pair of curved scissors, be converted thus into simple wounds, and an interrupted suture be employed to keep them in exact apposition and to restore the eye-lids to their primitive or normal conformation. Any loss of substance which may have occurred in their thickness, especially when the wounds are of a recent date, should be at once unhesitatingly supplied by a reunion of parts, for the inconveniences which are liable to result from a retraction of these loose shreds suffer no comparison with those which their chafing might possibly produce.

No apprehension need be entertained on account of the passage of the needle through the tarsal cartilages, which, like all the other tissues of the same genus, are not susceptible of inflammation; but care should be taken, when the suture is employed, to embrace within it a larger portion of the parts exterior to the globe of the eye than of their inside surface, so as to prevent the retroversion of the eye-lid; but above all, the eye-lashes and the margin of these membranous coverings should be fixed in their precise situation. Care also should be taken, when the solution of continuity is in the vicinity of the puncta lachrymalia, that the lachrymal ducts which arise there, are not included in the suture. This dressing should next be supported by immobility of the parts, by an appropriate bandage and rest. It will be proper to keep the internal surface of the injured eye-lids moist with a few drops of the oil of sweet almonds, in order to prevent the formation of adhesions to the

corresponding point of the ocular conjunctiva. We are possessed of several examples of various injuries of these parts which by the measures above described have been treated with unhooped for success.

Some diseases of the *conjunctiva*, having very frequently come under my notice, have directed my attention particularly to the anatomical structure of this membrane; I deem it my duty, therefore, to commence by stating my views on the latter subject.

The membrana conjunctiva consists of an extremely thin and very extensible cellular texture, which is formed by a net work of venous and arterial vessels, so numerous and so closely connected that fine injections scarcely leave a space between them. But, according to the observations of Prochaska, as well as from my own researches, these vessels differ essentially from those forming that part of the membrane which lines the internal surface of the eye-lids as far as the point of connexion with the globe of the eye, and from those which compose the covering of the convex and anterior surface of this globe. In the former portion, which I shall call the *conjunctiva palpebralis*, the texture of which appears to me to be analogous to that of mucous membranes, and to have in common with them all their properties, the blood-vessels are arranged in such a way that they nearly all run parallel in the direction of the eye-lid, forming thus concentric curves, more or less approximating one another, and being interlaced by very slender nervous filaments. The venous apparatus appears to us to lie not so deep as the arterial, and seems to form a sort of villous tissue, if we may say so, on the surface which is in contact with the globe of the eye. It is no doubt this villous texture which by exhalation conveys a mucous humour to the interior of the eye-lids, with which the tears mix which are poured out by the excretory canals of the lachrymal gland within the internal surface of this palpebral conjunctiva, and in the direction of the lesser angle of the eye. The characteristic features of this portion of the conjunctiva are, moreover, methinks, attested by the pathological affections which from preference, as it were, are disposed to attack it: for, it is the exclusive seat almost of

all the catarrhal, symptomatic or idiopathic ophthalmiæ, and these changes may, indeed, run to a very high extent before the *ocular* portion of the conjunctiva participates in them, at least in many cases.

Owing to the effects of the inflammation by which it has been attacked, its texture becomes susceptible of a still greater expansion, and is capable of producing a tumour so much projecting outwardly that it everts the eye-lids and forms an enormous exuberance in front of the globe of the eye by which the latter is covered completely. It is then that the vessels of which we have spoken may be perceived in such an injected condition that it will be impossible to plant the point of a pin into its texture without wounding some of them.

Guided by this anatomical knowledge, and after having previously overcome the causes which produced the eversion or tumefaction of the palpebral conjunctiva; in fine, when the affection has assumed a purely local character, the remedies to effect a cure consist in the first place of scarifying, if necessary, these excrescences in a direction parallel with the margin of the eye-lids, and afterwards in gently and uniformly pressing this vascular growth with the fingers, dipped previously in oil of sweet almonds, which may be done without giving much pain. The reduction which it is desirable to obtain in this way, is pretty readily accomplished, and nothing else remains to be done but to reinstate the eye-lids in their primitive relation and to keep them in that position by means of a band applied carefully and sufficiently tight. By this treatment I have constantly succeeded in many cases, where I had been obliged to put it in practice, and I have never been under the necessity of having recourse to excision, so much extolled by the French and English oculists.

From this general rule, however, is the swelling of the conjunctiva to be excepted, which is apt to supervene after a reunion of the eye-lid has been effected, as in the case of a wound with or without loss of substance. But, this is, in my opinion, the only instance where the excision of the membranous growth is indicated, and where even it will be indispensable, because of the retraction which had taken place in the eye-lid,

in consequence of the immediate reunion of the two flaps which were the effects of the division. But, even in that case, instead of making this excision across, as the majority of oculists recommend, I propose to make it in a direction parallel to the eye-lid, and to a greater or lesser extent, in proportion to the size of the everted mass of this membrane. A pair of scissors, sloped or curved on their flat side, is the best instrument for performing this operation. Frequent washing with a mild solution of emetic tartar, combined with equal parts of an aqueous solution of opium, will afterwards be sufficient to cause these incisions to cicatrize and to induce the engorged vessels of the remainder of the membrane completely to retract, so that the patient may anticipate a speedy recovery.

The vessels of the *ocular conjunctiva* are a good deal thinner, and furnish a more slender and closer texture which approaches the serous character; they are so arranged, as to form a circuitous and concentric net-work from the circumference to the centre, and towards the pupil. Their arrangement otherwise, in accordance with their kind, is analogous to that of the vessels of the palpebral conjunctiva. They arise from those which creep on the surface of the sclerotica, in order gradually to extend forward round the transparent cornea, where they disappear almost entirely; that is to say, the colouring matter ordinarily remains in the last rami which connect themselves with this cornea, or penetrate into its substance. These are the vessels which, in some cases of obstinate ophthalmia, give rise to what is denominated *chemosis*.

When the tumefaction which occasionally terminates by completely concealing the transparent cornea, has set at defiance the various indicated remedies, such as depletory and slightly repellent measures, it will then be necessary to dissect it out by piece-meal in a circular direction, with a pair of curved scissors and a dissecting forceps. Some remarkable phenomena attend these excisions: the part of the globe of the eye thus denuded of the ocular conjunctiva retains an exquisite sensibility, and takes a very considerable time again to become organized, or to form the cuticle of cicatrization which may be observed every where else on the surface of the body.

Under these circumstances it is necessary to guard against the friction of the eye-lids, which is very painful and troublesome, by frequently bathing them with fresh oil of sweet almonds, mixed with a small portion of distilled water of opium. We have had occasion several times to perform this operation, and have invariably observed afterwards the same effects. It was, moreover, on these occasions that we were enabled to observe that the blood-vessels of the conjunctiva reach not only to the centre of the transparent cornea, but that they traverse it throughout its whole extent.

That part of the conjunctiva which surrounds the carunculæ lachrymales is, after inflammations to which it has been subject, likewise susceptible of thickening, and of assuming even the character of a membranous and almost corneous texture. Very near akin to the membrana nictitans of aquatic birds, this species of pterygium is pretty rapidly developed, till it has grown to the size of a lentil; but after this it remains stationary, or its growth is barely perceptible. In this state, it impedes the functions of vision and the motions of the eye, prevents the eye-lids from shutting close and keeps up a perpetual irritation in the organ of sight; sometimes even this membranous growth spreads over the transparent cornea in a crescentic shape, by becoming somewhat attenuated, and covers the pupillary region in such a way as to intercept the passage of the rays of light. It appears that these growths are, on the whole, rarely to be met with in our climates, but are quite common in Egypt, where I have seen them in many individuals as well as in horses. It would be difficult to explain the cause of this, but they made their appearance more especially after acute and obstinate ophthalmiæ.

I have seen sometimes in Arabian horses a considerable number of these horny curtains occupy in a short time one half of the surface of the eye; two of my own exhibited this peculiarity. M. Loir, a veterinary surgeon of the army, at my request, extirpated these pterygia. I have myself performed this small operation on several of our soldiers. The only instance where it gave me some trouble was on account of an excrecence of the same character which M. Durant,

collector of the myry, had had in the right eye, ever since he had been attacked, some months before, with a most severe ophthalmia. This unguis, being of the size of a double lentil, occupied the large angle of the eye entirely, covered a part of the transparent cornea, and had posteriorly formed some adhesion with the margin of the opaque cornea, so that in the first place it became necessary to break up this adhesion, which I accomplished by passing a small bistoury on a very delicate grooved director, under this species of adventitious eye-lid, after which I extirpated it at its root behind the caruncula lachrymalis. Lotions of Goulard water, with which I combined a few grains of alum, were sufficient to cicatrize the small wound of the conjunctiva. I have also, since our return to France, performed the same operation upon several persons who had brought this infirmity with them from Egypt, and who were speedily cured.

Before passing over to the solutions of continuity which concern the globe of the eye in a more direct manner, we will point out some lesions of the *lachrymal gland* which must be of rare occurrence, for in the course of our long practice we have had but one opportunity to witness an instance of them in a private of the young guard. This person, in one of the battles which our armies fought in Old Castile, in Spain, had been struck by a spent ball on the receding angle of the external margin of the left orbit. One half of this leaden projectile penetrated through the substance of the lachrymal gland into the orbit, and was arrested in its career upon the orbital surface of the malar bone; the other half had made its way under the aponeurosis of the temporal muscle from whence it was afterwards easily extracted. But, in order to get at the former, it became necessary to dilate the base of the lower eyelid below the commissure, and to remove the remnants of the gland itself, together with the ball alluded to, which had been slightly incrusted with bone. These wounds healed promptly without any unpleasant occurrence, and to our great surprise the eye of the same side was unhurt; it seemed to us to be bedewed with serum sufficient for the motions of the eye-ball, and was consequently exempt from ophthalmia.

Could not, after this specimen, but more especially where a fistula lachrymalis presents but few chances of a cure, the gland of that name be extirpated, as has been proposed by some authors (an operation which could be done with the greatest ease), the excessive secretion of tears be obviated thereby, and the fistula be induced to disappear?

In the instance of the last mentioned affection, we will take occasion to say that the operations in use prove nearly all insufficient to accomplish a cure and are not seldom attended with danger. I have, in fact, come to the conviction that the tumour or fistula lachrymalis can be the result only of a spontaneous morbid cause, which changes the structure of the mucous membrane of the lachrymal passages,\* and that, without previously having overcome that cause, every operation is commonly unsuccessful, while in those instances in which care had been taken to act first upon this morbific principle, the operation is attended with success, not so much perhaps on account of its own intrinsic value, but rather on account of the destruction of the virus. The consequences of which the latter is the cause, are then suspended, the fistula disappears generally of its own accord, or some few local applications will suffice to perform a cure. The older writers, moreover, and some authors of the last century, amongst whom Louis and Foubert are most conspicuous,† had given it as their opinion that fistula lachrymalis was incapable of being cured by any operation, without having previously destroyed, by the employment of depuratory remedies, the morbid cause by which it had been produced: this was particularly the opinion entertained by the physicians of Padua in Italy, during the fifteenth century.

The first surgical indication to be fulfilled accordingly in the case of a lachrymal tumour, is in our opinion to open the sac, if it contain any purulent matter, by a semi-circular incision below the tendon of the eye-lid and by making some degree of compression upon the walls of the opened sac. And in

\* From this I except those cases in which the disorder had been occasioned by some mechanical cause, which happens very rarely and may be readily distinguished.

† See, *Les Mémoires de l'Académie Royale de Chirurgie.*

order to subdue the internal cause by which the disease is kept up, an alterative treatment may at the same time be employed; and inasmuch as this cause can frequently be referred to the presence of a varioloid, syphilitic or scrofulous virus, mercury in the shape of frictions upon the great angle of the eye, as well as taken internally, diaphoretics and bitters, according to the nature of the virus, will by degrees cause the fistulæ lachrymales resulting from it to disappear, provided they are not too inveterate. If there be symptoms of intense local inflammation present, this treatment should then be preceded by the application of a few leeches to the canine region. In confirmation of these views I might relate the cases of five or six soldiers who being attacked with tumours or fistulæ lachrymales, extremely well marked, although not of a chronic character, have been cured in the course of three, four or five months at most, by means of the various remedies above mentioned. Concerning this subject see also a notice inserted in the *Revue Médicale*.

But when the closing up of the nasal canal is owing to the obliteration of its parietes, or to an induration of the periosteum and of the mucous membrane which lines them, we agree that these means are insufficient, and that under such circumstances the flowing of the tears can be re-established only, by introducing into the obstructed ducts a canula of gold or silver, capable of surmounting these obstacles, and that afterwards it should be suffered to remain there; or it may be re-established by perforating the os unguis with the aid of a punch, so as to establish and preserve, by the formation of an artificial canal, a direct communication with the nasal fossæ. The introduction of these canulæ, which is more or less painful and difficult, and their presence in the lachrymal passages, are frequently accompanied by such serious inconveniences that the majority of patients are little inclined to endure their operation; while, on the other hand, these conductors are scarcely withdrawn from their position, when the fistula returns with all its disagreeable consequences. We have contrived a remedy very simple in its operation, which dispenses entirely with the employment of these foreign bodies, and which renders this

complaint quite bearable and invisible to public notice. It consists in the introduction into the fistulous hole of the lachrymal sac, or into that made by the bistoury, of a piece of cat-gut three or four lines long, the external extremity of which is fixed to a patch of English taffeta. The tears run off by means of this small conductor, and the patient need not give himself any further trouble than to sponge and dry with his handkerchief the aqueous fluids which accumulate slowly under the patch of silk. This method has perfectly succeeded with me in several instances, but I shall limit myself to the very brief relation of the following case.

Mdme. Sellier, a wood-seller at Gros Caillou, had been for several years afflicted with a fistula lachrymalis of the left eye, which, along the track of the fistulous opening, had frequently become complicated with erysipelas and abscesses in the region of the lachrymal sac. This woman had already undergone two operations, the one resulting in the passage of a string or seton into the nasal canal, which had not been attended by any success whatever, although the remedy had been persevered in for seven or eight months; the other, consisting in the introduction of a gold canula, had been productive of nervous symptoms of so serious a nature that it had to be withdrawn before the expiration of the ninth day. The patient had at length been abandoned to the resources of nature alone. Being called to her assistance on the occasion of a new phlegmonous abscess having supervened at the great angle of the eye, we undertook her treatment. Having made the incision which we have mentioned above, cleansed the purulent receptacle and the lachrymal sac by means of alkaline injections, and prescribed for the patient an alterative course of medicine internally, I placed the cat-gut into the little wound by fastening its external extremity to a patch of gummied taffeta, and repeated this small operation myself for the first eight days. The woman became, at last, accustomed to this daily dressing, and has continued it with so much benefit that she experiences now no other inconvenience from it than that of wiping away with her handkerchief, three or four times daily, the few tears which collect beneath the patch, which is scarcely observed.

The eye of this individual is as clean and clear as that of the other side. In this satisfactory condition she has been examined by some of the foreign practitioners who usually attend my clinical lectures.

The alterations of the *eye-ball* include two classes of disorders. The first consists in the contusion, or the direct or indirect concussion which the parts of this organ are doomed to sustain from extraneous bodies. The second comprehends the solutions of continuity which mechanical substances of whatever shape or character may inflict upon the same parts. Whether encroaching upon the integrity of one or both corneaæ at the same time; or whether they are complicated by divisions or lacerations of the internal membranes, these solutions of continuity may be followed by the discharge of the crystalline lens and the vitreous humour. This last circumstance can equally take place upon the occasion of the first species of alterations, when contusions may have been conveyed with sufficient violence to induce a rupture or laceration of the different coats of the globe of the eye.

We believe that, with respect to these diseases, we need not enter upon a theoretical description of them: the account of the cases to be given in succession will be sufficient to make known the symptoms and to point out the proper course to be pursued for their cure.

*First Observation.* M. Magny, chief officer of a brigade of the 2d regiment of light infantry, was, at the battle of Aboukir, struck by a ball which grazed the external side of the right orbit, and without wounding the skin, produced so violent a contusion in the eye of that side, that its nervous membrane lost the power of sensation, and it was all at once deprived of vision. He immediately felt a severe and heavy pain at the bottom of the orbit, accompanied by a sense of weight in the head, by effusion of blood into the cavities of the eye, and by engorgement of the conjunctiva. For the first fortnight he had been attended by the surgeon-major of his brigade.

When I saw him for the first time, the engorgement of the external membranes of the eye had disappeared; but through the transparent cornea a pretty large quantity of blood in a fluid

state could be observed, filling up three-quarters of the anterior chamber. The patient experienced already lancinating pains in the centre of the eye and frequent headach. The injured eye was sensibly larger than that of the sound side; and he was, moreover, troubled with insomnia and restlessness, all which made me apprehend the development of a carcinomatous affection. My apprehension was the more founded, as, subsequently to a similar accident which had occurred to an officer of the 75th demi-brigade, the eye of the latter had been attacked with all the symptoms of cancer, which could be removed only by the loss of this organ, and a long and regulated treatment. I am, in fact, persuaded that any quantity of blood, extravasated from its proper vessels, cannot remain for a length of time confined in the sensible parts of the organs, without entailing upon them a degree of irritation more or less intense and accompanied by unpleasant symptoms, as we have had occasion to remark upon other occasions.

After having, in the case of M. Magny, employed local depletion, topical applications and refrigerants, I deemed it indispensable to make an opening for the discharge of the blood effused into the cavities of the eye. I took the bistoury of Lafaye, as in the operation for cataract, and made an oblique section from below inwards into the transparent cornea. About one drachm of fluid and blackish looking blood was discharged. The issue of this foreign substance exhibited to me the iris which appeared to perform some slight motion, and the patient saw the light forthwith, but without being enabled to distinguish any objects. Every other symptom was dispersed, the eye became unloaded, and the cornea cicatrized without any opacity or deformity of consequence. This superior officer, on his return to France, where he made use of proper collyria, began to perceive the objects which he subsequently was enabled to distinguish. One of the aids of General Robin having met with an accident of this kind, occasioned by a similar cause and presenting the same phenomena, had an operation performed on himself, attended by a precisely analogous result.

*Second Observation.* If the shock directed against the ball of the eye has not been of too much force; or if it occurs in an oblique direction, the loss of sight can take place only for a short time. Etienne Ripert, a private of the 6th regiment of infantry of the guard, entered the hospital of Gros-Caillou on the 20th August 1821, on account of a blow which, three days previously, while at play with one of his comrades, he had received in the right orbit with a green switch of the size of a goose quill. The switch having been directed obliquely against the ball of the eye, had lacerated the ocular conjunctiva and made its way as far as the internal half of the orbit. The consequence of this was the instantaneous loss of vision of that side, which no doubt had been occasioned by the concussion of the ball and the shock sustained by the retina. The loss of vision still continued at the time of the patient's admission into the hospital: the iris did not contract, which led me to suspect the lesion of the nasal branch of the ophthalmic nerve.

I ordered scarified cups at once to be applied to the temples and to the nape of the neck, some leeches to the base of the orbit, and the feet to be put into mustard baths. At the end of the eighth day from the employment of these remedies, the pains had completely subsided, and vision, although feebly, began to return. In order to induce a more prompt and more perfect re-establishment of this function, I deemed it expedient to direct the application of two moxas to the posterior part of the head, below the occipital protuberances, and several other small Chinese moxas to the base and near the internal angle of the lower eye-lid. These revulsives produced the desired effects; vision soon recovered its full strength and the activity which it had possessed before the accident.

*Third Observation.* Dreux, a mounted chasseur of the ex-guard, received in single combat a sabre cut which pierced his right eye: a transverse wound of the cornea of several lines in diameter, with loss of substance of a small part of this membrane, was the consequence of this accident, which, according to the statement of the patient, had been immediately succeeded by the evacuation of some thick and limpid fluid, and by a sinking

of the ball of the eye. He was deprived of vision, suffered violent pain and had at first some vomiting. He had given up every hope of ever recovering the use of his eye again, but, to my great surprise, the globe had gradually resumed its original form and natural size, so that there could be no doubt that the vitreous humour, a certain quantity of which having actually escaped, had been reproduced. The edges of the wound approximated each other and contracted so slight an adhesion that their cicatrix continued to be rather depressed without being opaque. The iris which had been wounded, resumed its motions, while the pupil opposite the cicatrix remained indented. This soldier, previous to his leaving the hospital, could see the light, and a few months later he was enabled to distinguish colours and conspicuous objects.

*Fourth Observation.* In case of wounds of the cornea, accompanied with the escape of the aqueous membrane or iris, I shall point out a method of proceeding about which authors have said nothing, and which had been suggested to me by an unfortunate occurrence which happened to my daughter, Clémence-Isaure. When the hernia of these membranes has resulted from an injury of the cornea, occasioned by some *wounding* substance, it should be reduced at once with the utmost gentleness, by means of a blunt pointed golden style; every other metal, when applied to these delicate and exceedingly sensible parts, being liable to produce galvanic impressions highly unpleasant to the patient. The membranes resume their original position, and the deformity, and disturbance of the visual functions may be thus prevented which otherwise would not fail to occur, if the staphyloma were left to the resources of nature alone.

This young lady, being then about seven years old, while engaged in cutting the bread for her breakfast into pieces, suddenly felt her right eye pricked by a small piece of the crust of her bread. Frightened by it, she rashly carried her hand to the eye in order to seize this foreign substance; but, holding the knife in the same hand, the motion of which had forestalled, as it were, her will, instead of the finger she plunged the point of this instrument, recently sharpened as it was, into the centre

of the cornea, whereby the latter was cut obliquely along its whole external half, forming thus a wound of three or four lines in length. A portion of the aqueous membrane and even of the iris presented at the opening and constituted a hernia of the thickness of a pea. The aqueous humour had escaped; the eye had sunk in, and vision was totally suspended. I entered very nearly at that moment; the screams of the child and the uneasiness of her mother informed me beforehand of the occurrence of an accident. I had courage and coolness enough left to render assistance. Having placed the little patient in a convenient position, I returned, with my golden style, the membranous parts which formed the staphyloma, and endeavoured to replace them in their former situation. An entire reduction being thus obtained, I lowered the eye-lid and kept the eye closed by means of compresses soaked in Goulard water, strengthened by a few drops of spirits of camphor, and retained by an appropriate bandage. Several pediluvia, cooling drinks, diet and absolute rest in a dark chamber sufficed to accomplish a perfect cure in the space of a very few days. The sight of this eye had not been changed, and the cicatrix of the cornea is imperceptible.

An occurrence of the same kind, which certainly had not been treated in a sufficiently prompt and energetic manner, was far from being attended by an equally happy result, for the sight of the injured eye had been completely lost. We shall relate this fact literally as we have read it.

“Nicolas Lefevre, born at Paris July 2d 1544, commenced his studies at the college of La Marche; where in his earliest youth he was near being destroyed by an accident as remarkable as it was distressing. While engaged in making a pen, some of the clippings cut off by the pen-knife flew into his right eye; where, in the act of carrying his hand to it at that moment, because of the violent pain which he felt there, he carried with it also the point of the knife, which rent the eye. In consequence of this he was taken dangerously ill; and after he had been restored to health, it appeared to him as if the powers of the lost eye had been transferred entirely to the

ether, with which he could see as plainly as he before could with both." (Le P. Niceron.)

*Fifth Observation.* The great majority of the phenomena of which we have spoken in the preceding cases, and among others the reproduction of the vitreous humour, will doubtless derive still more decided proof from the highly interesting case which I am now about to relate.

Peter Pecheur, a serjeant of the fifth regiment of the royal guards, being hurried in leaving his apartment, on March 20th 1821, at six o'clock in the morning, in order to attend the roll-call, inadvertently fell upon a heap of musket locks, lying in the middle of his room. The head having first struck against them, and his left eye having come in contact with one of the isolated caps, projecting from this confused mass of armour, the ball of this organ had been rent by the point of that piece of iron and was emptied of nearly all its contents. In his hand, which he mechanically carried towards the eye, he found a glairy substance, within which he observed another body of a white colour and round shape, like a lentil (which was the crystalline lens, floating no doubt in a certain portion of the aqueous and vitreous humours).

Having washed his eye with cold water, and covered it with a cloth, he repaired to the hospital, where I attended him a few hours after the accident. The eye-lids of this organ were ecchymosed, the conjunctiva red and swollen, the transparent cornea divided, at its lower part and near its point of adhesion to the sclerotica, by a fringed cut, through which a flap of the iris protruded. The ball of the eye had sunk or was depressed, and from the opening into the cornea, notwithstanding the staphyloma produced by the iris and the membrane of the aqueous humour, there issued an albuminous sanguineo-lent fluid; the bottom of the remainder of this eye was of a deep brown colour. The patient complained of violent pain in the orbit, over the whole corresponding side of the head, and especially at the temple.

I first freed the eye from the tears and blood with which it was covered, by washing it freely with cold water; I made numerous scarifications upon the ecchymosed eye-lids, and

finally with a golden tinge returned that part of the iris which had been displaced and torn from a portion of its internal adhesion (on the nasal side). This reduction being accomplished with every possible care, and the edges of the wound being drawn together and placed in contact, and having washed the eye-lids with Goulard water, I closed them and caused them to be kept so by one of my assistants, whilst I opened with the lancet one of the temporal arteries in order to obtain a direct depletion. The small orifice made in this way was reunited with a strip of adhesive plaster, and in conclusion I applied a retaining bandage over the eye, as over the whole temporal region of the same side. The patient was kept in the dark; confined to a rigid diet and to the use of acidulated mucilaginous drinks, sweetened with sugar and kept cold; I directed ice to the head and sinapisms to the feet. The local pains and the cephalalgia decreased, and the patient enjoyed for several quarters of an hour a most comfortable rest; but, some febrile action having become developed during the evening, another copious venesection from the arm was resorted to, and the use of ice and cooling drinks continued.

On my visiting him the next day, nervous symptoms having manifested themselves, I directed several scarified cups to be applied to the nape of the neck and between the shoulders. The other treatment was continued, the dressings were not disturbed, and not removed entirely until the ninth day.

We were fully persuaded that this eye was lost, or that at least it would remain deprived of the functions of vision, which, in fact, had already occurred at the time of the accident; but to our great and most agreeable surprise, the ball, which had at first been depressed or reduced to a very small volume, owing to the loss of the crystalline lens, and doubtless also of a part of the vitreous humour, had resumed, or very nearly so, its original form and natural size. The patient told us that he had had a glimpse of light; yet, there was still a very great confusion in the anterior chamber, and the aqueous humour never ceased to issue through the wound of the cornea, where, besides, small and irregular membranous flaps could be perceived, which no doubt belonged to the covering of this liquor

and which we cut off with a very small pair of curved scissors. We immediately placed the eye-lids again in contact; I put over them a fine compress, moistened previously with camphorated wine; and an aromatic poultice was laid upon the forehead and temporal region of the same side, taking care not to let it come too near the affected eye.

The application of ice to the head, the use of mustard pediluvia, of cooling drinks and scarified cups frequently repeated, were persevered in. The dressing was not more than twice daily renewed for the purpose of changing the cataplasms: after the expiration of the fifteenth day, however, I separated the eye-lids again and examined carefully what had taken place in the interior of the eye.

We perceived in the first place the pupil indented at its inferior segment, with a considerable inclination towards the temple; contraction had been preserved at this external half, while the other half which corresponded to the nose had lost it. A crescentic flaw, about one line and a half in size might be observed at the point where the iris adhered to the internal half of the periphery of the opening of the scleroteca; which flaw appeared to us to be owing to the attachment of the iris being torn off at that point, at the nasal side of the opening of which we have spoken before. In other respects the patient told us that he could see with this eye the light a little better, and he thought even that he could faintly perceive large objects divided into two unequal portions, but in a manner still very much confused. From that moment, we left the eye free, protected merely by a simple piece of cloth, and all that was done externally was to bathe it daily with lotions composed of wine slightly camphorated and mixed with a strong decoction of poppies.

All the inflammatory symptoms dispersed by degrees, and on the twentieth day the wound of the cornea began to cicatrize, which was accomplished towards the end of April. From that time the eye assumed a round appearance and seemed to have again taken its shape, and very nearly also its original size. The opening of the pupil had grown smaller and inclined strongly downwards and outwards from the side of the temple,

so that it is no longer enabled to receive the cone of the luminous rays converged by the transparent cornea; they enter almost entirely through the lateral and crescentic flaw which has been mentioned. However, when Pecheur fixes the eye in its straight line, the visual cone which falls upon the centre of the cornea, simultaneously penetrates into the interior through the two openings, and the person sees then every object double or divided in two parts, but they are still clouded and surrounded by a variegated light. Armed with a concave lens of two degrees and looking at objects in such a way as to see them exclusively through the internal lateral flaw, he will be able to discern them exactly, and the prismatic colours by which they are surrounded when he is deprived of his glasses, are far less perceptible. In fine, with the assistance of the convex glass, this non-commissioned officer can see any objects simultaneously with the right eye, and thus continue to pursue his duties and functions. He left the hospital on May 15th, and was exhibited before the philomathic society in their meeting of the 29th inst.

1. This exceedingly curious fact evidently proves, therefore, that the vitreous humour, though it may have escaped to a considerable amount through some solution of continuity, can and actually does reproduce itself. The first proof of this we met with, was in the mounted chasseur of the ex-guard of whom we have given an account above. Being dressed upon the same plan as Pecheur, the eye had in like manner resumed afterwards its original shape and volume. The optic functions were even more perfectly restored in that case, which is owing, however, to the circumstance that, as the crystalline lens had not left its receptacle as in the last case, there was consequently no aberration in the course of the rays of light, and the chasseur had, therefore, no occasion to make use of a convex glass.

2. The result of the wound of Pecheur appears to us to have been analogous to that which occurred in an individual, on whom the operation for cataract had been performed by an incision made at the base of the transparent cornea and by an artificial pupil at the point of adhesion of the iris, near the

nasal side of the opening of the sclerotica, where it attaches itself, so as to impart to this laceration a crescentic shape. We have reason to believe that vision will improve still more in this eye and that the perception of objects will become still more exact, as soon as nature shall have accustomed herself to make the visual cone enter altogether through this lateral flaw, which has besides increased in size.

*Sixth Observation.* Another instance of those remarkable optic changes, of which, as far as I know, nobody has as yet spoken, presented itself recently for my observation in the person of one Anthony Scarlati, a native of Turin in Savoy, and a serjeant of the 6th regiment of infantry of the royal guards. This soldier, holding then the same rank in the twelfth regiment of light infantry, during the siege of Saragossa, in 1808, had been struck by a ball, while near the end of its course, on the superior and external lateral margin of the right orbit. So violent a contusion instantaneously resulted in an extensive ecchymosis spreading over the affected parts, and in the loss of vision on the same side. Inflammatory symptoms having come on, the patient had been compelled to repair to the ambulances, where he passed several weeks without being able to see out of this eye, in order to undergo the treatment which was indicated in this case, and which consisted in general bleeding, in the application of leeches around the eye-lids, in the internal exhibition of refrigerants, and in the use of anodyne collyria externally.

After this treatment, and ever since the return of vision to the eye which had been contused, remarkable changes, which we shall endeavour to explain, manifested themselves forthwith in the functions of this organ and continued so for fifteen years afterwards, when finally this non-commissioned officer, on his arrival in Spain, during the late expedition in 1823, experienced an almost total loss of sight. The following are the results of an examination of the patient which we recently had an opportunity to make.

1. The pupil and the iris are in a state of unnatural contraction; they are consequently smaller than those of the left eye, and have receded about two lines.
2. At the upper portion of this membrane a deviation or rent

may be observed, which detaches its great periphery from the corresponding margin of the sclerotica, in a diameter proportionate to the displacement of the pupil. The latter retains in its lower segment some little power of motion, of which it is deprived in its upper half. The result of this twofold alteration is that the person sees objects double or divided into two unequal parts, and that under certain circumstances, according to the direction given by him to the ball of the eye and to the eye-lids, he can at times only discern separately the figures placed in the situation of the superior fissure; and at times only those which are in a line with the pupil. Thus, for instance, if the upper eye-lid has been separated by the individual himself, and the eye looks vertically upwards, he will perceive only the figures which are above him through this artificial rent, while the rays of those figures are prevented from passing through the pupil. Again, if the eye-lid is lowered, and the person looks downwards, the pupil alone and exclusively will in its turn receive the impression of the objects which are to be seen on the horizon. At last, when the eye is fixed in its axis, the eye-lid being still separated, the rays of figures penetrate at once and simultaneously through the two openings into the interior of the globe of the eye, which in the person establishes a sort of amblyopia. To oculists I must leave the merit of contriving some particular method of centring the rays of light in such cases, and of rendering the perception of objects in their unity and real character more convenient. The accidental opening which, in the instance of Scarlati, exists above the pupil, and which certainly had been produced only by the destruction of the natural adhesions of the iris to the superior margin of the foramen of the opaque cornea, proves moreover that the adhesions uniting these two membranes are very slight and delicate.

As to the almost total extinction of sight which this eye experienced during the late expedition to Spain, it was owing no doubt to the fact that the crystalline lens, whose nutritive vessels had been violently shaken by the shot in the orbit, had gradually lost its properties and become opaque, beginning at its superior part (the spot nearest to the concussion), for there remains yet a little lucidity at its inferior half.

Without confining my attention to the other diseases to which the ball of the eye is particularly exposed, and which have already been sufficiently described by authors, I shall now develope my opinion on the *properties of the iris*, and on the want of relation existing between this membrane and the immediate organs of vision, the optic nerve and the retina.

I have generally observed that the irritation or the changes to which the nervous system of organic life is liable, exert directly or indirectly an influence, more or less decided, upon the nerves of relation, while the injuries which are exclusively confined to the latter, have little or no effect upon the integrity of the functions of the nerves or organs of internal life, or these effects, if they should become apparent, are infinitely more tardy than in the former. In order to sustain this opinion, I could examine by comparison the influence which the diseases of one of these nervous systems produce upon the other, and *vice versa*. This is an undertaking which I deem highly important, and which might form the subject matter of an important investigation in physiology and pathology; but under the expectation that this question will soon be agitated, I propose to examine what is the nature of the sympathetic relation which exists between the iris and the retina, or the optic nerve.

It has been strictly believed to this day that the iris derived its contractile or retractile power from the nervous influence of the optic nerve or the retina: a majority, therefore, of the advocates of this doctrine formerly recommended never to operate for cataract, especially by extraction, when the iris was deprived of its motions, for they presumed that in this case the organ of vision was paralysed likewise; but since then experience having taught that, under certain circumstances, the optic functions are resuscitated after the depression or extraction of the cataract, notwithstanding the immobility of the iris, it has been supposed that this membranous partition can contract only so far as the retina may receive the impression which it requires in order to effect the contraction.\*

\* See "Dictionnaire des Sciences Médicales," and other classical authors on the diseases of the eyes.

Far from it that the iris should thus depend upon the nervous influence of the retina or the optic nerve, my researches and the observations which I have collected, have convinced me now, that the properties of this membrane emanate chiefly from its peculiar texture and from the ciliary nerves which it principally receives from the lenticular ganglion of the great sympathetic. This disposition throws some light on the nature of its paralytic affection, when it does exist, and on the reasons why the same affection does not occur, whenever the optic nerves are paralysed or altered by any particular disease. Thus I have seen cases of gutta serena, in which the iris had retained its motive powers. The little Englishman whose sight I had the good fortune to restore in Spain, after the battle of Corunna, (see the article *Moxa*, Clinique Chirurg. Vol. III.) furnishes an incontrovertible proof of it.

In cases of well formed cataract, the retina can preserve its integrity, be capable again to resume its functions, as soon as it shall be enabled to receive the impression of objects by the extraction or depression of the dusky veil by which the passage of the rays of light is intercepted, although the iris should be paralysed, for this latter affection depends upon the lesion of a set of nerves which belongs to the internal functions, and which communicates only indirectly with those of the life of relation, by means of delicate nervous anastomoses. I wish, however, to be well understood that from this rule I deduct the adhesions which the iris may form, and which are liable to be confounded with a paralysis of this membranous partition.

I shall now proceed to relate some cases with reference to the views which I have just advanced on the properties of the iris, and on the independence of the affections of this membrane, and of those by which the direct organs of vision may become attacked.

The following case will concern the lesion of the nerves which endow the iris with motive power. The subject of it is M. Charles Ripault, a corporal of the sixth troop of lancers of the royal guards, 27 years old, who had been admitted into the hospital on May 19th 1827, the sixth day after he had re-

ceived a wound in the right eye from a thrust with a buttonless foil.

This wound instantaneously occasioned a paralysis of the iris, as was indicated by the extreme dilatation of the pupil, and by its immobility. Notwithstanding this, vision was preserved so as to enable him to appreciate all the physical qualities of external objects, with this modification only, as the patient declares, that the representations of those objects appeared to him to be cloudy towards their centre, while he could discern them perfectly around the circumference.

The seat of the injury was the internal angle of the eye outside and rather below the caruncula lachrymalis, in as much as the point of the instrument had penetrated obliquely as far as the bottom of the internal wall of the orbit, and had injured the corresponding side of the sclerotica, and with it no doubt also the branches of the nasal nerve which, at that very point, pass through the substance of this membrane in their way to the iris, as well as through the tendinous attachments of the trochlearis muscle. The patient had instantly dropped down and fainted away.

The inflammation which had already come on, when admitted into the hospital, had been subdued by bleeding from the temporal artery, by scarified cups applied to the nape of the neck, and to the dorsal regions, by mustard pediluvia, by the application of ice to the head, and by refrigerants. The paralysis of the iris remained; but, by the application of several small moxas to the temple, and by means of convex glasses for the injured eye, the imperfection of sight had been greatly relieved.

A gun-smith's apprentice, 14 years of age, received, in 1818, by mistake, a blow with a musket ramrod upon the central part of the inferior margin of the left orbit. This violent shock was followed immediately by the loss of vision of the eye of that side, while the iris retained the power of motion unimpaired. He continued in this condition for ten or eleven months, and when he became apprehensive of the loss of the other eye, the sight of which seemed to him to grow weaker, he called upon me for advice. After a careful examination of

it, I pursued the following mode of treatment: first of all scarified cups were applied to the left temple, to the nape of neck, to the neck and to the shoulders. After giving him a gentle emetic, I put him upon the use of bitters, and began with the application of the moxa. The first I put upon the left side of the nape of the neck in order to come as near as possible to the origin of the optic nerves; a second was applied between the angle of the left maxilla and the mastoid process upon the course of the trunk of the facial nerve of the same side; and four or five smaller ones were put in succession upon the corresponding temporal region. After the application of the first moxas the patient became sensible of the impression of light, and soon after could distinguish objects. This faculty progressively increased, and finally became as perfect as that of the right eye. The motions of the iris had never ceased to go on with as much regularity as in its healthy state, which circumstance induced me to make it the principal object of my reflexions.

For several months this young man believed himself to be cured entirely, and indeed, he saw out of both eyes with equal accuracy. After that space of time he observed, however, that his vision on the left side sensibly declined, and soon after he was deprived of it altogether. Being alarmed at this new occurrence, he again requested me to give him my advice. I perceived, in fact, that a complete cataract had intercepted the passage of the rays of light into this eye, and produced on that side total blindness, whilst, at the same time the iris had preserved its motive faculty, and was in a perfectly sound condition. There are then two remarkable phenomena: the first is the paralysis of the retina and the loss of the visual faculties, while the iris itself had not undergone the least change of structure; the second showed itself in the sudden formation of the cataract. The one furnishes an irresistible proof of the properties of the iris\* being independent of the retina;

\* The effects of belladonna, the application of which to the conjunctiva, or even to the eye-lids, paralyses the iris instantaneously, without depriving the individual of the power of sight, afford another proof that the vital properties of this membrane are dependent upon the branches of the ophthalmic which supply the conjunctiva and the eye-lids, and which directly communicate with the ciliary nerves.

the other, that the crystalline lens does not derive its sustenance by inhalation, as has been conjectured by the majority of writers, but rather by a species of vascular circulation, like all the other living parts of organized bodies; for if the very slender vessels of the crystalline lens had not been ruptured in their passage from the capsular membrane to the lens, it would never have lost its transparency in so sudden a manner.†

This last assertion is the more authenticated, as in the case of the same person, whom we have repeatedly had occasion to see, a year after the formation of his cataract (for which we applied then, nothing else but an emunctory to both sides of the nucha which he had kept open during that time), we perceived to our great astonishment that the opacity of the crystalline lens had entirely disappeared, but that the cataract nevertheless had been reproduced at the end of several months. We believe, however, still that this relapse must be owing to the suppression of the discharge. We have lost sight of this patient, and have therefore not been able to follow the course of his disorder.

A not less remarkable instance, which also seems to prove that the crystalline lens participates in the general circulation, presented itself at the hospital of the guards in the person of James Bache, a private of the second Swiss regiment. This man, in consequence of a violent contusion which he had received upon the temporal side of the right eye, had been attacked with a cataract, whose commencement, progress and stationary condition, in which it afterwards remained for a pretty long time, had exhibited features quite peculiar. The disease first commenced around the whole circumference of the crystalline lens, the centre of which, remaining perfectly lucid, allowed the patient to distinguish objects quite clearly, though in somewhat smaller proportions. The opacity afterwards progressed very slowly from the opaque circumference of this body towards its transparent portion, not indeed by a circular and throughout uniform layer, but by concentric

† Soemmering has injected these vessels as far as the crystalline capsule; but as they do not admit the colouring part of the blood beyond this covering, it has been very unadvisedly thought that the crystalline lens is sustained by inhalation.

lines or rays, in the spaces of which there existed, of course, other divergent rays, partaking of the same degree of lucidity as the centre, so that this arrangement imparted to the periphery of the lens, the aspect of a small strip of cloth irregularly divided. Under these circumstances it appeared to the patient as if all external objects, were unequally divided also, in their largest diameter; and it is sufficiently easy to account for this optical illusion, which doubtless recognised no other cause than that the rays of light were inflected and interrupted by the opaque lines of which we have spoken. In the course of time and in proportion as the opacity became more distinct and began to spread over the centre as well as between these lines, the optic effects which the patient experienced, remaining upon the whole the same, seemed, besides, to be increased by a slight degree of cloudiness the obscurity of which might have been interrupted at intervals. Topical revulsives, so generally resorted to under such circumstances, produced no other effect than a trifling enlargement of the lucid portion of the crystalline lens.

A young lady from Paris, seventeen or eighteen years of age, has furnished us with a third specimen of a case perfectly analogous to the last mentioned. Previously to undertaking her cure, she had been introduced to our esteemed colleague M. Demours, honorary member of the Royal Academy of Medicine. In this case the crystalline lens presented a white opaque star which occupied nearly its whole anterior surface; a delicate crown, scolloped in its lucid circumference, could be with difficulty perceived, and through it this young person saw the light and the truncated shadows of the objects placed between the rays of the sun and her own eye. This blindness had by degrees arisen from the opacity of the centre of the crystalline lens and appeared daily to increase.

After having unloaded the vessels of the head by revulsive depletions, such as scarified cups put on the temple and nape of neck, we applied the moxa to the first mentioned place and to the corresponding side of the base of the cranium: the number, thus applied in succession, amounted to twelve. Under the influence of these topical revulsives the opacity gradually

decreased, and four months later the young lady could discern any object with almost as much distinctness as with the right eye. Indeed, at that time, there could be nothing more perceived on the ocular lens but a trifling cloudiness of a whitish aspect, of the size of a very small lentil, which in the course of time will also finally disappear. Since she had gone into the country without my knowledge, I could not, to my great regret, present her again to M. Demours.

Without this vascular circulation which necessarily exists between the crystalline capsule and its lens, it would certainly be difficult to explain the causes of the return of lucidity to this transparent body, after it has once become opaque.

In the instance of tetanus, where all the muscles, excited by the nerves of organic life, are in a state of permanent retraction or contraction, the properties of the iris never sustain any change, and the alternating contraction and dilatation of the pupil may be observed to go on as in the healthy state.

In certain diseases of the brain, as dropsical effusion into the ventricles, the same phenomena will be observed. The sensitive functions are considerably weakened or paralysed by the concentric or excentric pressure which the nerves of the sentient organs (as those of vision for example) have to endure at their origin, in consequence of the dilatation of the ventricles; while the iris remains unimpaired and retains its motive powers, which even may be sympathetically augmented by the irritation induced in the system of the organs of internal life by means of drastic or emetic medicines.\* An English lady who had been afflicted with this disease, two children whom I have attended also in Paris, and a mounted grenadier of the guards, while under my care at the hospital of Gros Caillou, have furnished me with striking proofs of it. There is no doubt on my mind that in this grenadier, after a violent fall which he had had on the occiput, effusion had taken place in the ventricles of the brain; at least, he displayed all the usual symptoms; dull pain accompanied with a sense of weight in

\* In verminous disorders the motions of the iris and pupil are accelerated; the pupil may likewise be made to contract by the application of nitrate of silver to the conjunctiva, and yet vision will not be affected thereby.

the head, a remarkable decline of all the senses and of the faculty of speech, a sensible change in the powers of locomotion, paralysis in the second degree of the arm of the right side, numbness and habitual coldness of the legs. The intellectual faculties alone remained in their natural condition. Nevertheless, the iris of this man, whom by the application of moxas I restored to health, retained all its properties and motions. I observed even that the pupil contracted in proportion as drastic purgatives were more or less briskly administered. The same fact I have had occasion to notice in a great many individuals who had met with injuries of the head, attended with loss of sight and a sensible change in all the organs of the life of relation.

The iris for the same reason may lose its organic properties, whilst the optic nerve, the retina and the other parts of the eye may preserve their utmost integrity and perform all their functions. A female, thirty-four years old, of brown complexion and of a robust and healthy constitution, presented a disorder of the same nature; in both her eyes the iris had been completely paralysed, and was dilated in three-quarters of its diameter; by the application of the most powerful stimulants and by the sudden impression of a glaring light the aperture of the pupil could with difficulty be made to contract for about a quarter of a line. Notwithstanding this very perceptible deformity, she could observe objects very well, and could even accurately distinguish their forms and colours, provided they were not too near her eyes.

In several soldiers of the guards I have had occasion also to observe this membrane to lose its motive powers completely, owing to a concussion received upon the margin of the orbit, or after an injury of the cornea with a sharp-pointed instrument, accompanied with lesion of the greater periphery of the iris, while the faculty of vision itself remained unimpaired; but, on the other hand, it is equally true to state that the same mechanical causes are capable of destroying the vital properties of one or the other membrane, as we have ourselves more especially observed in a life-guardsman and in a soldier of the

royal guards: the latter was even on that account discharged from the service.

In cases of organic affections of the internal viscera, such as the chronic phlegmasiae of some of the principal viscera of the abdomen, the opening of the iris becomes dilated by degrees, while the retina preserves the integrity of its optic functions.

My remarks on *iritis*, or inflammation of the iris, show that this inflammation, which most commonly may be traced to repelled syphilis, after having passed through all its stages, is attended by the following results, as the Austrian Professor Beer has judiciously observed: 1. By discoloration of the anterior surface of the diseased membrane; 2. By the fraying or destruction of a part of the diameter of its pupillary opening, and more especially of its superior segment. I have never observed that the notch which is apt to form in the superior part of this membrane, had occurred alike in its inferior part: the latter loses its motive power, whilst the flap which survives the destruction of the other, retains it more or less perceptibly. I have repeatedly witnessed this phenomenon; but it never appeared to me so conclusive as in the case of a mounted grenadier, who had been attended in my wards, where it seemed to depend on the distribution of the nerves and of the ciliary vessels which run chiefly from above over the whole remainder of this membrane.

An officer of the British navy, twenty-seven or twenty-eight years of age, had been suddenly attacked by a violent ophthalmia, accompanied with iritis. There were some slight ulcerations upon the transparent cornea and a prodigious swelling in the ocular conjunctiva, which being the result of a metastasis of the repelled syphilitic virus of one or more chancres on the penis, had produced a genuine chemosis. This serious disorder, which luckily had been treated and subdued by the proper remedies, was succeeded by discolouration and paralysis of the iris, the pupil of which remained dilated, whilst the optic functions were preserved. The chemosis had been dissected out throughout the whole periphery of the transparent cornea; but there are still a pretty considerable number of red capillary vessels which run across

the cornea from one side to the other, and which must be destroyed in order to restore it to its entire lucidity.

The preceding remarks and cases will, we trust, sufficiently prove that the retina and the iris may be affected simultaneously or separately, according to the nature or the modus operandi of the causes productive of the change of structure; but amongst these causes there is one as remarkable as it is rare, which we may further adduce in support of our views; this is the direct impression which, under certain circumstances, the rays of the sun are apt to produce upon the texture of these membranes. Numerous persons had become subject to the influence of this cause on the day of the eclipse of that constellation, the 7th September 1820.

From amongst the cases which I had collected on this occasion, I propose to select only the two following, as they were accompanied by some peculiar circumstances, and by pretty serious occurrences.

The subject of the first, of the name of J. B. Jacquemart, a corporal of the artillery train, being inexperienced in the manner of observing a solar eclipse, had made use of a darkened piece of glass with a clear spot in its middle, which he had himself made there, on purpose of being thereby better enabled to observe that celestial phenomenon. Notwithstanding the smart, troublesome and very painful impression which the passage of the sun's rays had made upon him through the transparent part of the glass, he yet continued to look at it until the end of the eclipse; when, soon afterwards, he was seized with vertigo, a lively pain along the whole right side of the head, corresponding with that of the eye, through which he had observed it, and was almost deprived of vision in that eye; the iris and the other parts of this organ remained unhurt. Some weeks after, this soldier, suffering continually from acute pain in his head, repaired to the hospital, where I attended him. The vessels of the affected eye were injected, and the pupil a little more contracted than that of the left side; it had, however, retained its power of motion, although the vision was much obscured and almost annihilated.

In this instance, then, it will be seen that a very small cone

of solar rays had directly reached the retina, and that its irritating effect had communicated itself to the optic nerve, as far even as its origin in the interior of the brain. After two blood-lettings from the temporal artery and jugular vein, I applied cups to the temple and nape of the neck; and afterwards had recourse to the employment of ice upon the head and of several moxas, which completely restored the function of vision. Nevertheless the patient ever afterwards felt a dull pain in the whole right side of his head.

The subject of the second case, J. B. Paintiaux, a private of the 5th regiment of infantry of the guards, entered the hospital about the time when the former left it. He had used his left eye for observing the eclipse of the sun, with the assistance of a glass, the centre of which was opaque, and its periphery lucid or transparent. He had been less incommoded than the other, because the sun's rays had not been directed against the pupil, through which they had passed only much broken, while the circumference of the transparent cornea, and especially the ocular conjunctiva, most forcibly received the impression of these rays, which set such an intense idiopathic inflammation on foot, that the blood-vessels of this membrane had become injected as far as the centre of the cornea, through a slight albugo which had simultaneously formed itself over a large proportion of its surface. The employment of antiphlogistic remedies diminished these symptoms; but the pupil is considerably reduced, and the iris has lost its motive power, while the retina has retained its optic properties.

If the affections of vision which result from this cause are of rare occurrence, those which proceed from an electric shock, as from a flash of lightning for instance, must be not less so, for it is pretty difficult to understand how the electric spark could precisely change that part of the brain which gives origin to the optic nerves, or the parts of the eye which enter into the composition of sight, without leaving some external marks behind, or without attacking in some measure the remainder of the encephalon or the organs of the other senses. The fact which we are going to relate furnishes, however, an instance

of such a cause, which by some means or other had separately operated upon the organs of vision.

During the fall of 1819, Peter Rouvray, whilst watching a flock of sheep, and believing it to be on the eve of a violent tempest, took refuge under a tree, against the trunk of which he leaned, when he received about his head an electric shock (a stroke of thunder as the patient expressed himself) at the moment of the passage of the lightning through this tree, several of the principal branches of which had been severed from it. The shock experienced by Rouvray had been such, that he became instantaneously deprived of vision, staggered, and was compelled to sit down, that he might not lose his balance. From that time he never ceased to see objects in a turbid light, and to feel almost habitually some kind of trembling sensation in both globes of his eyes. Nevertheless, when at the recruiting season he had drawn the lot, he was transferred as fusileer to the second regiment of the guards, where soon afterwards he was attacked with a nervous fever which considerably aggravated his original affection. At the time when he entered the hospital, which happened some time in the month of October 1824, this man could scarcely discern the colours or the forms of objects by the light of day, whilst he was capable of distinguishing perfectly well all their physical properties in the utmost darkness of night; but at the same time, and whilst his eye-lids were closed, he was troubled with hallucinations more or less varied. At times he perceived flashes of fire interspersed with all colours; at others, objects multiplied and of different shapes and forms, which disturbed his slumbers and kept him almost continually in a state of insomnia. To these aberrations were superadded a painful feeling of pressure about the head, nervous spasms in all the limbs, an almost complete dilatation of both pupils, and the habitually rotatory motion of the globe of the eyes, which has been mentioned before. The pulse was tremulous, small and febrile, the skin almost imperspirable, and the emaciation of body extreme; the digestive functions, however, continued to be carried on sufficiently well.

After having taken a little blood from him by means of cups,

applied to the temples, to the nape of the neck and between the shoulders, and after having acted upon the stomach through the exhibition of a mild and gentle emetic, we resorted to the application of several moxas around the base of the cranium, behind the ears, and to the temples. After the application of the two first, which had been put between the inferior occipital protuberances and the mastoid processes, the trembling of the globe of the eyes subsided; the pupils immediately contracted again; the hallucinations considerably abated, and the patient could bear the light of day. Successive applications of the same topical revulsive extended this improvement still further and encouraged us to anticipate a complete recovery. He had already begun to recover his strength; nutrition went on more perfectly, and sleep had again become regular, and the only remaining inconvenience was that the patient still perceived objects in the dark much better than through the medium of the broad light of day.

Tonics internally administered, weak infusions of cinchona, a generous diet, and embrocations with phosphorated spirituous lotions, applied externally to the eyes, have principally contributed to the condition into which we have brought him.

An analogous, though much more serious occurrence, which ought to be ascribed to the effects of laborious microscopic investigations, presents itself at the present day in the person of M. de Savigny, a member of the Institute, one of our illustrious friends and associates in Egypt.

It is no doubt exceedingly difficult to point out the causes of the motions of dilatation and contraction of the pupil, and to explain their mechanism; but as in man and in the majority of the lower animals also these motions appear to be independent of the will of the individual, one might be induced to believe that the *stimulus* causing the contraction of the fibres of the iris, is exclusively furnished by the nervous twigs which proceed from the ophthalmic ganglion, and which belong to the nervous system of organic life. But then it should be considered, 1, that this membranous curtain, in man as well as in several animals, receives directly one or two filaments from the nasal nerve which belongs to the first branch of the fifth

pair of the brain; 2, that the motions of this partition seem to be subject to various modifications more or less distinctly marked in the same individuals, in obedience either to the influence of a very powerful impression of light irritating this membranous veil, or in consequence of the sudden appearance of images of a more or less exciting aspect, according to their colour or their form; 3, that this partition seems indeed to perform its motions under the influence of a volition which though rarely expressed in man, is yet quite perceptible in certain birds, as those, for example, of the family of parrots.\* After these observations it will be admitted that the iris is an organ of a mixed character, one part of which may to a certain extent and in certain degrees obey the dictates of the will of the individual, whilst the other performs its functions without the latter participating in it.†

We may, therefore, conclude of this structure (which at a later period I intend to describe more in detail), and of the plan of distribution of the nerves which supply this membranous curtain, that the relaxation of the iris or the dilatation of the pupil is effected by the puckering up of the flexuous arteries which are freely disposed of in zigzag or in spiroid lines, as well as by the engorgement of these vessels, occasioned by the stimulus which the nervous filaments of the ophthalmic ganglion transmit to this membrane, while the contraction of this movable curtain, or the constriction of the pupil, is doubtless effected only by the engorgement of the small arterial or ciliary crown, after the manner of the strings of a purse. This engorgement would seem to be induced by the stimulus

\* According to the celebrated Cuvier, the star-fish not only appears to possess the faculty of moving the pupil at will like the parrots, but it exhibits besides a prolongation situated at the superior margin of this opening, and arranged in the shape of a closed palm-leaf, which this fish doubtless lowers at pleasure before the crystalline lens, after the fashion of a blind. In the torpedo this opaque membrane is complete, whereby he is enabled to close the pupil entirely at will. (See *Leçons d'Anatomie Comparée*, Vol. II.)

† The same properties may be observed in the urinary bladder, the sphincter of which contracts in obedience to the stimulus of the nerves of animal life; while the body of this membranous bag receives its stimulus from those of organic life.

of the long ciliary nerves which the nasal nerve sends off to supply the circumference of this opening, without communicating with those of the lenticular ganglion; in this way the irritation of the stomach or lungs frequently occasions the constriction of the pupil, while those of the intestines, of the uterus or bladder, have appeared to us to be the cause of its dilatation, as this may be observed occasionally in infants troubled with worms.

Notwithstanding these two nervous systems, the motions of the iris are certainly independent of the nervous influence of the retina, of which assertion the account of the following facts will furnish completely satisfactory proofs.

The chameleon has no movable iris in the interior of the eye; the functions of this membrane are performed by the external eye-lid, which display a form and structure quite peculiar. Behind the transparent cornea, however, and around the crystalline lens, may be seen a small zone of a pearly appearance, interspersed with light yellow streaks so fine as scarcely to be perceived. This zone, which is of an extremely close and compact texture, is blended with the ciliary processes, and adheres to the periphery of the crystalline lens, the anterior segment of which advances beyond its edges by about a line, in such a way that it seems to have no other use than that of refracting the rays of light towards the crystalline lens, while the external orbital eye-lid which is attached to the periphery of the globe of the eye (whose motions it attends) by a close and very fine membranous fold of the conjunctiva, dilates or contracts its opening in order to modify the passage of the rays of light, by means of two plans of circular and radiated motor fibres which enter into its composition. This opening, which in reality supplies the place of the pupil, has a round, rather elliptic shape, which shuts entirely, the assertion of some natural philosophers to the contrary notwithstanding. Another singular phenomenon which may be observed in this reptile, is that he moves each of his two eyes invertedly, and seems to perceive objects in opposite directions; in fact, if a chameleon and a tree-frog (*rana pratensis*) are put together into a glass vessel, the latter, frightened

by his imminent danger, runs about the cage, anxious to avoid his enemy; the chameleon, without stirring in the least from his place, pursues his prey with one of his eyes, while the other remains fixed; and when the little creature least expects it, the chameleon seizes him with his long and flexible tongue and swallows him with the utmost composure.

In making the dissection of a chameleon, during my sojourn in Egypt, I have not found the slightest vestige of what might be regarded in him as the organ of hearing, of which he seems to be destitute. It is, therefore, no doubt on this account that nature endowed him with the faculty of perceiving with both his eyes, simultaneously, the outlines of objects which are situated in opposite directions.

Prochaska, one of the most able anatomists of Europe, by completely successful injections which are in my possession, and which he had presented to me, has demonstrated that the structure of the radiating and circular vessels of the iris is the same as that of the elementary fibre of the muscles or of the powers of locomotion. These injections prove that the fibres as well as the folds and circles of the iris, exactly like the spiral-like fibres of the arteries themselves, are composed of a series of small capillary arteries, very perceptible by the microscope, which are entirely or partially twisted around each other, according to the formation or particular habits of each of these organs. These spiral-like capillary arterioles are surrounded and interlaced by some foreign substance which is lost in the injection, and the same anatomist maintains that it partakes of the nature of muscular fibrin, of albumen concrete and thickened in the arteries, and of a cellular texture, very thin in the intestines and in the iris. The distribution of these primitive and constituent arterioles and of these particular retractile fibres may with propriety be compared (as I intend to do in my memoir on hemorrhagies, see Clin. Chirurg. Vol. III.) to the threads used for making ropes of various thickness, even to that of a cable. These fibres are shortened in consequence of the engorgement of the vessels or of the afflux of blood which runs through them, upon the same principle on which a ship's rigging at a certain degree of exten-

tension is shortened to a greater or lesser extent, from its becoming soaked by some fluid, such as water. It is by these means that such enormous masses as vessels of war are raised from the ground and launched afterwards into the sea with the utmost facility.

In order to prove the correctness of the assertion which I have just made upon the effects of the contractility occasioned by the afflux of the blood into the elementary vessels of the motor fibre, it will suffice to observe that, when a muscle is divided transversely near the origin of its nutritious or organic arteries, that part which is most remote from it will be no longer susceptible of contraction. The same thing happens to all the muscles, whenever the arteries going there have been tied, at least until nature shall have replaced them by other vessels by which a new circulation may be established. In other respects we believe that the afflux of blood into these linear vessels is brought about through the agency of galvanic vital excitations, unknown in nature, which doubtless proceed from the encephalic nerves to the organs of locomotion, as well as from those of the ganglionic system to the muscular organs of internal life.

#### *Of Ophthalmia, and especially of the Endemic Ophthalmia of Egypt.*

The membrane which lines the interior of the eye-lids and the surface of the globe of the eye is highly susceptible of inflammation and of producing ophthalmia, a disease frequently quite serious and very obstinate; but in this article we shall almost exclusively confine ourselves to that species which we have had occasion to observe in Egypt, because it possessed those two characteristics in the highest degree. The eyes having been struck all at once by the burning light of the sun, either directly, or reflected by the whitish soil of that country, and having been moreover exposed there to the effects of the suppression of the cutaneous perspiration, an obstinate ophthalmia, and in many individuals complete blindness, had then resulted from those circumstances.

The seat of the ophthalmia is confined to the vessels of the

conjunctiva, or extends deeply to those of all the coats of the eye, including even those of the iris. Yet this inflammation, owing to the organic difference which distinguishes that part of the membrana conjunctiva lining the interior of the eyelids from that which covers the ball of the eye, will necessarily present some varieties, according to its being located in one or in both parts of this membrane. That kind which attacks the palpebral conjunctiva, and which occasions the engorgement of the numberless vessels of this species of mucous tissue, is characterised by the greater or lesser intensity of injection or redness of these vessels; the sensation of pain accompanying these first symptoms is, however, less lively than when inflammation has become established in the ocular conjunctiva. A degree of swelling in proportion to the intensity of the disorder is subsequently established in that portion of this membrane which lines the internal surface of the eyelids; a purulent exudation takes place on its surface, or rather the villous extremities of its vessels exhale or transude a peculiar humour, the colour and consistency of which will be in proportion to the idiosyncrasy of the individual subjects, or to the presence of the virus complicating the disease. In cases of the virus being of a syphilitic nature, the symptoms will assume a more serious character, and travel much more rapidly; ophthalmia displays then even some peculiar features, the redness of the margin of the eye-lids is clearer; the pus discharged by it has a greenish tint as in gonorrhœa, and excoriates the parts with which it comes in contact, and the patient suffers a good deal during the night.

The tears being, on account of the inflammation, unable to reach the puncta lachrymalia, give rise to an almost incessant weeping, and becoming mixed with the purulent matter furnished by the inflamed vessels of the palpebral conjunctiva, augment still more the irritation of the remainder of the eyeball which they attack by their corrosive properties; they are the cause afterwards of ulcerations on the transparent cornea, the progress of which is so much more rapid as the patients are exposed to the influence of a hot and moist season or climate, and as this moisture is saturated with deleterious mias-

mata, or with alcoholic gaseous matter which is evaporated from different sources capable of producing those heterogeneous principles, as we have observed in several instances. In fine, the transparent cornea, being highly susceptible of the operation of those purulent acrid fluids, is very prone to tear, and is sometimes perforated with great ease; its texture being of a gelatinous nature, it can be readily dissolved, particularly when the small number of nervous branches distributed to them have been attacked or destroyed by any cause whatever, as those are for example which we have pointed out. This perforation of the cornea which occurred sometimes in Egypt all at once, imparted to the ophthalmia of that country quite a peculiar character. To a great many of our patients it happened during the first night of the attack of the disease, when it was preceded by a lively and sharp pain, and by deep seated cephalgia. The small portion of the transparent cornea which constituted the last layer of the ulceration, burst with a kind of noise similar to that of the smacking of a whip. This cleft has appeared to us to be the result of the rarefaction of the aqueous humour, occasioned by the heat of the season and climate, as well as by the inflammation. The humour made its escape outwards together with the membrane containing it, in order to form the hernia; the tumour then was of a dull gray aspect, but was of a darker colour, whenever it had been formed at the expense of the iris. The one, as well as the other, evinced considerable sensibility on coming in contact with the lightest external substances, or on the friction of the eye-lids. Generally speaking, the staphyloma produced by them, diminished by degrees, returned into the anterior chamber, and the membranes resumed their original position. In this case, the opening of the transparent cornea would be closed by the sinking of its borders and leave a small opaque and depressed cicatrix behind, which intercepted only at first the passage of the rays of light. In other instances some portion of it would remain outside and be strangulated by the closing up of the opening, lose its sensibility, and acquire a certain consistency, or rather it would swell, separate into several

lobules, and assume a carcinomatous character, particularly if it had been complicated by a venereal taint.

It has happened, also, under certain circumstances, that the capsule of the crystalline lens had been ruptured and that the latter escaped through the opening of the cornea, provided its size would allow it to pass out, or that it fell into the posterior or anterior chamber. It rarely happened in such a case that the eye was not left inflated, because the membranes being changed and subsequently reduced by suppuration, the organ of vision became completely disorganized and lost its functions. The same distressing result has been observed to happen to numerous natives; chiefly to indigent persons who lie almost naked on the ground and in the open air; live upon improper food, and in day-time are exposed to the dust, and to the burning rays of the sun, against which they make no kind of exertion to protect themselves. There were also a considerable number of instances of this kind amongst the twenty-five whom, after the first year, we had sent back to France; but these unfortunate men were unluckily shipwrecked on the coast of Sicily, and every one of them drowned.\*

The inflammation of the ocular conjunctiva always commences at the vessels of the two angles of the eyes; the injection afterwards spreads gradually or suddenly to the transparent cornea. During the first few moments, these vessels are very distinct; but their interstices are very soon filled up, and the whole surface of the eye is covered with vessels so red and swollen that they frequently produce a chemosis. The colouring part of the blood ordinarily becomes stationary at the extremities of those which ramify around the greater periphery of the transparent cornea. Instances, however, occur where the proper vessels of the cornea, or rather of that part of the conjunctiva which covers it (notwithstanding the extreme delicacy of this membranous expansion, and the very great tightness of its adhesion) become injected, and standing out in bold relief before this cornea, intercept the passage of the rays

\* The convoy of these blind individuals was commanded by the intendant commissary in chief, Sucy.

of light. Besides the majority of the symptoms already described which it has in common with the ophthalmia of the palpebral conjunctiva, it causes an extremely violent local pain, which by the patient is attributed to the presence of some grains of sand, but which proceeds from no other cause than from those injected vessels. This pain is so intense that, as has been observed by some English traveller, it is as if the pupils were in the fire, and pricked incessantly with pins. In addition to this there are then always dimness of sight and intolerance of light. The coats of the ball of the eye also become more promptly involved in the inflammation than in the other species of ophthalmia; violent pain in the head, vertigo, watchfulness, fever, sometimes even delirium; such are the other symptoms which manifest themselves and contribute to render this disease more or less serious.

The dilatation of the vessels of the ocular conjunctiva, we stated, causes more intense pain, than that of the vessels of the palpebral conjunctiva. We believe that this difference is owing to the circumstance that the fascicles of the long ciliary nerves furnish a large number of twigs which cross the scleroteca near the transparent cornea, reach as far as the surface of these organs, and finally lose themselves in that part of the conjunctiva by which they are covered; and as these nerves are furnished by the lenticular ganglia which belong emphatically speaking to the great sympathetic, however slight any injury of this system of the nerves may be, it is invariably accompanied by pain infinitely more keen and lively than that belonging to the nerves of the life of relation. The latter are principally those which supply that part of the conjunctiva which lines the internal surface of the eye-lids.

We have observed that the first species of ophthalmia, or that which almost exclusively attacks the palpebral conjunctiva, was commonly the result of the suppression of a diarrhoea, of a discharge, or of some eruption having existed previously somewhere on the surface of the body. This kind of distemper was likewise more frequent, particularly in Egypt, in those seasons and low and damp places in which it was

kept up by gaseous emanations of a more or less irritating\* and mephitic nature.

The second species of ophthalmia, or that which almost suddenly attacks the ocular conjunctiva, and which results in engorgement and intense redness of the bloodvessels of this part of the membrane, has for its predisposing causes the action of the fiery light of the sun, the refraction or reverberation of the burning sands of the desert, and the immoderate use of alcoholic liquors, such as the whiskey of the country.

Amongst the plagues with which, for about six weeks, we had been afflicted in Egypt, we may find another additional cause of this ocular ophthalmia, particularly in children of the lower orders, who are there extremely subject to it, and who are almost all attacked by it, in the presence and bites of the mosquitoes, insects which under certain atmospheric circumstances multiply to such an extent that we were obliged to shake our clothes, as we shake off the dust. In some districts there are, moreover, such quantities of locusts that the wind drove and piled them up by myriads in hollow places, where by putrefaction they became one of the sources of the epidemic ophthalmiae which we have observed there. With the exception of mechanical agencies which will operate directly upon the tissues of the organ of vision, it is in all cases very evident that the essential and exciting cause of both species of ophthalmia which have just been discussed, may be traced back to a suppression of the cutaneous perspiration, occasioned by the

\* On my journey to Thorn, in June 1812, while on our march to Russia, I had been compelled to sleep on a bundle of straw in the bar-room of a tavern, where during the whole night a great deal of whiskey (schnaps) had been consumed, and was greatly surprised on my waking at break of day, to have been attacked with an ophthalmia which prevented me not only from distinguishing any objects, but almost from seeing the light. Independent of this serious accident, I found myself at the same time in a certain state of intoxication which I could ascribe only to the alcoholic vapours with which the apartment in which I had been accommodated for the night, had been filled without my being aware of it. Two cups applied to the temples, lotions of tepid water with a small addition of Goullard water, the open air and the exercise on horseback which I was compelled to take in order to follow the movements of the army (being conducted by my servant), were sufficient promptly to subdue this disorder.

sudden changes from a very high temperature in day time to its usually very low state during night, more especially in damp places.

To the above causes combined, and to their operation alone, but not to a contagious principle, is therefore, the serious and obstinate ophthalmia to be ascribed, which prevailed in Egypt amongst the French and foreign troops who occupied that beautiful country, during the years 1798, 1799, 1800 and 1801. I therefore deem it incumbent upon me to record here my opinion upon this subject, illustrated already by Doctor Fournier, in his translation of Scarpa's treatise on the diseases of the eyes, from the notes and observations which I had communicated to that learned physician.

Many of the English, Dutch, Prussian and Bavarian physicians have maintained, and maintain still, that the ophthalmia which has prevailed amongst the troops of these nations, during their occupation of the frontiers of France in the damp and low districts of Picardy, Flanders and the Palatinate, during the years 1816 and 1817, had been contagious, and that this disease had grown out of the ophthalmia of Egypt (according to the same physicians contagious likewise), which the troops composing the army of the East had brought with them from that ancient part of the world, where it is endemic.

Notwithstanding all the objections which we, the Baron Desgenettes and myself, were enabled to oppose, M. Roux, on the occasion of reading his report\* before the Medical Society of the Faculty, made us not only acquainted with the opinion suggested by the English, but told us that he had fully adopted it himself, and stated in that printed account that this opinion gained ground and was believed. Now, the interests of science and public tranquillity indispensably require to correct this error, and to prove that the disease bears not the slightest contagious character. Gonorrhœal ophthalmia with purulent discharge may be communicated by the immediate transmission of the purulent fluid from a diseased person to

\* Voyage fait en Angleterre en 1814, ou Parallèle de la Chirurgie Angloise avec la Chirurgie Françoise. Par M. P. I. Roux. Trans.

the internal margin of the eye-lid of a healthy individual; and that is the only species of infection which may be urged to exist. Any other way of communication cannot be proved and does not exist; reason and experience both demonstrate it to be impossible.

Two circumstances seem to us to have led to the belief in the existence of miasmatic contagion, as insisted upon by the physicians alluded to: first, the rapid and general propagation of the disease from the soldiers first attacked by it to the troops occupying the same places, or even dwellings; secondly, the recurrences of this disorder in those who had been cured of it, by communication or frequent intercourse which they had with those who were affected with it.

With the view to reply to these conjectures, which run into one another, I would observe that, instead of ascribing this ophthalmia to the passage of morbid miasmata from the diseased eyes of some individual to the sound ones of another—an event also in other respects not merely improbable, but even impossible,—its development in the latter as well as in the former, in spite of the appearances of this contagion, cannot be referred to any other causes than to the deleterious influence of the climate, or rather to the remarkable changes which the seasons have undergone, more especially in the western countries of Europe, during the years of the occupation (of the frontiers of France) in 1816, 17 and 18. Indeed, these singular and uncommon changes have imparted to the climate of those countries a character similar to that which the climate of Egypt and of other regions along the coast of Africa possesses, where ophthalmia is endemic without being contagious. It appears to me to be clearly demonstrated that during the summers of the two last years the atmospheric constitution, more especially in the low and damp districts of Flanders, of Picardy, Alsace and the Palatinate, or along the banks of the larger rivers, has displayed features similar to those of Egypt for instance. Thus the thermometer rose in the parts of Europe just named, in day-time at noon, and under the influence of southerly or south-easterly winds, to  $25^{\circ}$  or  $27^{\circ}$

(Réaumur),\* whilst at night, by northerly, north-westerly or north-easterly winds, it fell to  $11^{\circ}$  and even to  $9^{\circ}$ .† (Now this is absolutely the character of the climate of Egypt. Compare on this subject my "*Relation Chirurgicale de l'Armée d'Orient, Articles Ophthalmie, Classification des Saisons, &c.*")

After this it will be easily understood, how the cantonments, encampments or bivouacs of the soldiers of the army of occupation, on a soil reduced to powder, and more or less arid after harvest time, the daily manœuvres of the troops and the reverberation of the sun upon the whitish soil during those seasons, burning as they were, in Egypt, must have predisposed the organ of sight to an irritation which afterwards excited the immediate cause of the ophthalmia, that is to say, the sudden suppression of cutaneous perspiration, effected by the quick transition from the burning heat of day to the icy coldness of the night, whilst the thermometer fell to  $9^{\circ}$  and  $8^{\circ}$ . The consequences of these transitions must be so much more sensibly felt, as a copious miasmatic moisture prevailed simultaneously, which the emanations from the sea, lakes, ponds and rivers of those low countries perpetually produce, and which the coldness of the nights condenses and precipitates upon any thing with which the soil is covered. Now the soldiers exposed to the action of the air, without the precautions requisite to meet those sudden changes, the nature of which is unknown to them, must necessarily be subject to the deleterious effects of these atmospheric vicissitudes. The same has happened also to others who did not take the necessary precautions; and that they had been neglected we know from the statements we have received from numerous individuals. The disease had become epidemic and seemed to have a contagious appearance, because these pernicious atmospheric influences extended and penetrated every where. Thus, for example, the sick, the wounded or the fever patients of a hospital or of an ambulance, the windows of which had not been

\* From  $88^{\circ}$  to  $93^{\circ}$  by Fahrenheit's thermometer. *Trans.*

† From  $8^{\circ}$  to  $12^{\circ}$  Fahrenheit. *Trans.*

carefully shut during the night; again, those who were not compelled to cover themselves with a blanket or to keep a warm night-cap on their heads, were attacked, as we have seen it in our own soldiers in the hospitals of Cairo, by an ophthalmia which was most unreasonably attributed to contagion, proceeding, as was supposed, from some individuals who by chance had been admitted into the wards of these ambulances at the same time, when the causes foreign to such contagion, expended their utmost violence upon the other patients. To several English physicians who, at the commencement of the year 1818, came to Paris to consult me, on account of this affection, I proposed to substantiate these facts which I had witnessed myself. On the other hand, the regimen and method of treatment, almost purely local, which had been put into practice, in consequence of the mistakes committed with respect to the true causes of the disease, have not a little contributed to aggravate and to propagate it.

But what proves still further the correctness of my assertion, respecting the ophthalmia which had prevailed in Europe, amongst the troops of the army of occupation, is that the staff and other officers who were well lodged, well clothed and accustomed by the force of education and close reasoning, to observe the precepts of dietetics better than private soldiers, had been generally exempt from this disease, although the very same officers, as well as the medical officers, freely communicated with, and were constantly in the midst of, these diseased or healthy soldiers. I, of course, always except from this ophthalmia, that species which has been occasioned by the reper-  
cussion of a gonorrhœal discharge, which is quite common amongst the English, because of their physicians treating the urethral running by means of astringent injections. The dampness of the climate of Great Britain is, moreover, very well calculated to favour the development of ophthalmia, and to keep it up.

In Egypt, also, we might have been warranted to believe that the ophthalmic patients communicated their disorder to our wounded with whom they were promiscuously treated in the same wards, as, indeed, the ophthalmia appeared in the

latter about the same time, and travelled with the same rapidity. But we soon perceived that they were indebted for the disease of their eyes to the same causes which had produced it in the former, that is to say, to the suppression of the cutaneous perspiration. At first our hospitals were destitute of the necessary furniture, especially of cover-lids, and the soldiers besides being not at all accustomed to the extreme heat of the climate, would not submit to be covered up at night; but as soon as they learnt how to take the proper precautionary measures, and as soon as we had obtained the necessary cover-lids and caps to cover our patients and to protect our soldiers against the action of the night air, the ophthalmia disappeared. An ophthalmic patient was lodged beside another person whose eyes were in a healthy condition; as long as the latter was sheltered from the chilliness and dampness of the night air his eyes remained sound. Those whose ophthalmia had assumed a chronic character and who took it with them to France, for the same reason never communicated it to their countrymen. We have met with them in our hospitals or in the Hotel of the Invalids, mixing with other persons or with the soldiers of other regiments, whilst the supposed contagion never could be detected. It is wrong, therefore, to attribute to the propagation and transmission of this disease, the epidemic ophthalmiæ which have since that broken out in different countries of Europe and in different seasons. We may then infer from all these facts, that without the immediate application of the puriform matter from the eyes of an ophthalmic person to those of a healthy individual, as we have before stated, no contagion can take place, unless the eyes of the latter (supposing them to be very irritable) approach those of the patient near enough to receive almost immediately the gaseous molecules of the purulent tears of the former.

Several celebrated physicians of Germany and England, being convinced also of the truth of the assertions just made by me, have written no doubt in a more luminous manner and entered more into details, concerning the errors into which the advocates of the theory of contagion have fallen. Professor Baltz, surgeon in chief to the royal Prussian guards,

has published at Berlin, in 1824, in the sense of our own views, a work which has been crowned by the Academy of Utrecht, and which he had undertaken in reply to a question on the subject of this matter.

Nevertheless it is possible that the miasmatic emanations, exuding from inflamed or ulcerated surfaces of the eyes or eye-lids, being carried to a certain, and of course very short distance, may produce an affection of the same kind in the eyes of a pretty healthy individual, who might happen to be in this part of infected atmosphere, according to the susceptibility or extreme irritability of the organs of sight of such a person. If, indeed, we direct for one moment our attention to the vital properties of the ocular and palpebral conjunctiva, we must become impressed with the conviction that this membrane is liable to a greater or lesser degree of irritation and inflammation, in proportion always to individual idiosyncrasies, upon coming in immediate contact with certain substances or certain liquids, which otherwise produce no particular effect whatever upon other organs apparently more irritable and more delicate, such as for instance the mucous membranes of the viscera, while these become violently irritated by substances which, in their turn, produce no impression upon the conjunctiva; this, however, is highly susceptible to the impressions made by different degrees of temperature. Thus, for example, the men who in Egypt superintend the chicken oven, regulate the heat of these ovens by the changes which that membrane undergoes, with as much precision as if they made use of a thermometer, and these impressions are made upon those persons with so much accuracy and regularity, that they rarely differ half a degree or one degree at most from that instrument.

We might again allege our own example as an instance of the possibility of an ophthalmia instantaneously developed, by coming in contact with certain miasmatic effluvia of an infected and irritating character at the distance of a few inches only: the following fact will confirm the truth of this assertion, without militating against that already insinuated.

One Bonneau, 27 years of age, a private of the sixth regiment

of infantry of the guards, previously to his entering the military service, and while he was employed as a journeyman butcher, had been directed, in 1814,\* by the master of the shambles to skin and to open a cow which was suspected to have died of a carbuncle. No sooner had the first incision been made into the belly, when this young man was suddenly seized with vertigo and instantaneous loss of vision. He declared to have felt a very sensible and sudden impression, made upon his face by a warm vapour of an offensive smell, which had become disengaged from the abdominal cavity of the animal.

These primary effects were succeeded by an acute ophthalmia of a purulent nature, which continued to exist in different degrees until the year 1824, as well as an eruption of small furunculous excrescences which had made their appearance in various places of the face during the first twenty-four hours. This man, who had never been affected either with syphilis, or psora, or any other herpetic disorder, had to undergo a variety of treatments to rid himself from these complaints. The ophthalmia alone proved obstinate and became in the sequel complicated by an abnormal dilatation of the pupils and a remarkable irregularity in the perception of diminutive objects.

We succeeded, however, in re-establishing the functions of these organs by making use for some time of revulsives and of an anti-ophthalmic pomatum, as well as by the application of cleansing and slightly camphorated collyria, the formula for which will be given below.

I shall now return to the description of ophthalmia, and point out the treatment which has appeared to me to be most serviceable.

Among the terminations of this disease hypopion is but of rare occurrence. It announces itself as an opaque point at the transparent cornea which deranges the passage of the optic cone. This point increases by degrees, protrudes from the surface of the eye, and occupies a space of more or less extent

\* This happened during the occupation of Paris by the foreign troops.

upon the cornea, the laminæ of which become detached from one another. Hypopion is distinguished from opacity or *albugo* by a slight fluctuation which may be easily ascertained with the assistance of the extremity of a probe.

When the person is of an irritable habit of body and the ophthalmia of long standing, the engorgement of the conjunctiva is often very considerable; this membrane forms a circular eminence around the cornea and gets beyond the eye-lids; these again are turned downwards, swell, and present the utmost resistance to their reduction.

The tarsi cartilages rarely participate in this species of inflammation. But when they do, the lachrymal ducts situated in the midst of them are destroyed in consequence of the suppuration commonly resulting from it; the eye-lids lose their shape and shrink. Owing to consecutive inflammation supervening upon the globe of the eye, loss of sight almost invariably takes place afterwards. Of this I have witnessed several examples.

In fine, ophthalmia weakens the organ of sight, predisposes to cataract, to fistula lachrymalis, to amaurosis, and is not seldom succeeded by nyctalopia.\*

While in Egypt I have had repeatedly occasion to notice that ophthalmia, which more frequently occurs there during the inundation of the Nile than during any other season, more frequently attacked persons of light than of dark complexion, and that then the right eye was also more seriously affected than the left; for almost all those who have become blind of one eye, are so on the right eye. This may, perhaps, depend on the habit of twinkling with the left eye, whenever a glaring light strikes it, whilst the right eye is more willing to brave it; it may perhaps be referred also to the custom which, generally speaking, all persons indulge themselves in of lying on the right side, so that this part of the body is the first to receive the impressions of dampness from the soil.

\* In cases of nyctalopia and gutta serena we have successfully employed the moxa, by applying it to the course of the principal branches of the facial (lesser sympathetic) nerve.

Whenever ophthalmia has not been neglected, and it is treated according to the principles of surgery, it is not attended by distressing consequences: but the blind confidence of the soldier in the remedies of mountebanks, his neglecting to repair to the hospitals, and the little exactness with which at first he attends to the regimen prescribed to him, frequently render every care abortive.

In the two species of ophthalmia which I have described, whatever may have caused them, when they are accompanied by redness and a sensible engorgement of the vessels of the eye, depletory measures are indicated, such as depletion from the arm or foot, still better from the temporal artery, and cups applied to the temples, to the nape of the neck and between the shoulders. These measures, which ought to be repeated, according to the plethoric condition of the person, and according to the intensity of the inflammation, should be followed up by stimulating pediluvia, by steaming the diseased eye with the vapour of a boiling decoction of some emollient and anodyne articles, by lotions made of a strong decoction of linseed, and poppy heads, with the addition of a small quantity of belladonna, taking care to apply them, as much as possible, to the intermediate space of the eye-lids, for when applied externally they are apt to increase the œdema; poultices particularly have this inconvenience, independent of the restraint and weight which they exert upon the eye.

A paste (une étoupage), made of the white of some eggs, beaten up with a few drops of rose-water, and with a few grains of sulphate of alumine and of camphor, applied in the evening over the eyes, allays the pain and diminishes the inflammation.

The effects of these topical applications may be promoted by directing the patient to take cooling and mucilaginous drinks internally, and by giving him during the night several glasses of an anodyne emulsion; a suitable regimen should also be prescribed, perspiration be kept up, and the light shut out from him.

As the inflammation diminishes and the vessels become unloaded, collyria strengthened by a few drops of acetate of lead

in solution, or by a solution of tartarized antimony, mixed with a proportionate quantity of distilled water of opium, gradually to be augmented, may subsequently be used. When resolution has commenced, a decoction of the rind of pomegranate, or a weak solution of sulphate of zinc, may then be employed. The temperature of these various collyria ought to be raised to  $25^{\circ}$  or  $30^{\circ}$  of Reaumur's thermometer (or from  $88^{\circ}$  to  $101^{\circ}$  of Fahrenheit).

If the engorgement of the conjunctiva, however, proves obstinate, and this should be swollen, a few scarifications may be made with the lancet; or the most projecting points may even be cut off.

When the eye-lids are turned down and form a circular eminence around the eye, a few scarifications may be made at first in the direction of the eye-lid, carefully avoiding to wound the tarsi cartilages; astringent collyria may also be used for a few hours, and subsequently, as we have already mentioned, the reduction of the eye-lids may be made, with the precaution to rub them with a little cerate and not to wound the eye-ball; they are then to be put again in their place by means of a bandage, and the patient should be directed to keep himself perfectly quiet. This mode of treatment has invariably succeeded with me, but requires a little practice.

If, however, these measures should prove inadequate, the exuberant growth of the conjunctiva must be extirpated, taking care to save the tarsi cartilages, as much as possible; the eye-lid will thereby be reduced and afterwards assume its original shape.

Although the remedies hitherto described may suit alike both species of ophthalmia, still, whenever this affection is almost exclusively seated in the palpebral conjunctiva, so that it might be denominated catarrhal ophthalmia, it will be proper, immediately after having made a sufficient sanguineous depletion, to have recourse to emetics under observance of all the requisite precautions, and to gentle purgatives, to be repeated according to circumstances; if, on the contrary, the ophthalmia has its seat in the ocular conjunctiva, it will be of service to persevere longer than in the other species with the

revulsive capillary depletions, with the cooling and sedative drinks, with the privation of light, and with the use of anodyne and gently repellent collyria.

Ulcers of the eye-lids are to be treated with desiccant substances and mild *escharotics*. We have in this case successfully employed a gentle cautery with the nitrate of silver and a pomatum of the following formula:

Take of cerate, made of virgin wax and oil of sweet almonds,	1 oz.
Red oxide of mercury, ground and purified,	4 grs.
Prepared tutty,	16 grs.
Camphor dissolved in the yolk of an egg,	4 grs.
Paste of cochineal,	8 grs.
Saffron in powder,	6 grs.

Mix and triturate in a marble mortar.

A very small quantity of this pomatum may be put at night, before going to bed, along the margin of the eye-lids, after which the eyes are to be covered with a cloth not very tightly applied.

The cure of ulcers of the cornea and of albogoes should never be thought of, until the inflammation of the cornea has been completely removed. Fumigations with the red oxide of mercury, and the immediate application of some mild caustic, will usually be sufficient to cause them to disappear; besides which it will almost always be necessary to establish issues upon the sides of the neck, between the mastoid processes and the occipital protuberances.\*

The seton, painful and very troublesome as it is, is dangerous also, and has appeared to me to aggravate the complaint.

There is no occasion for any attempt to cause the staphyloma to recede, during its growth: nature herself must first have begun its reduction, when she may afterwards be assisted merely by a little pressure properly made. If the tumour

\* If the opacity should be of a certain degree of thickness, it may be lifted up in small laminae with a very fine bistoury. I have had occasion to perform this operation in the case of a young lady at Toulon; which measure materially contributed towards the destruction of an albigo of long standing which covered the whole cornea, and intercepted entirely the passage of light. Its transparency was restored in that part which I had made thinner with the bistoury, and in the course of time this individual was enabled to discern any objects quite clearly.

loses its sensibility and should remain stationary outside, it must then be extirpated with a pair of curved and flattened scissars. I have never had occasion to perform this operation more than twice; the organ of vision had in both these cases partially resumed the performance of its functions.

Where the ophthalmia is kept up by a venereal taint, it is indispensable to remove its cause by the use of anti-syphilitic remedies to be taken internally, especially by the sudorific and cleansing syrups, with which a proportionate quantity of oxy-muriate of mercury may be combined. Mercurial frictions should likewise be made to the soles of the feet and at great intervals from each other. If it has resulted from suppression of the *gonorrhœal* discharge, the local irritation may be subdued by scarifying the temples, by anodynes, and by the introduction into the urethra of a gum elastic bougie, besmeared with a coat of opium. If these measures will not produce the desired effect, another gonorrhœa might be inoculated with advantage, or an alkaline injection might be made into the canal of the urethra.

When ophthalmia is of a purely gastric origin, bleeding is not at all indicated; cupping with the scarifier is sometimes required; and incisions into the eye-lids, if they are oedematous, may be of service. Warm wine and repellent collyria should, indeed, be applied immediately; but for the affection of the stomach, the patient should be prevailed on to take some mild emetics, followed up by some bitter draughts. If the disease should not yield to these means, the establishment of issues upon the sides of the neck, or behind the ears, will be required.

Deep seated and remarkable organic changes, detected in the course of autopsical examinations, may be the results of ophthalmia. I have been enabled to convince myself fully of this after the fatal issue of the disease of M. Poireé, brigadier of the guides of the army of the East. This individual, while performing quarantine at Marseilles, on his return to France, had been attacked with an inflammatory ophthalmia, which being attended by violent pains in the head, had deprived him completely of the light of day, and was finally transferred to the hospital of the consular guards. All the inflammatory

symptoms had then disappeared; his eyes, however, were more protruding than in their natural condition, and the iris was motionless. If the patient felt there but slight pains, he had a keen and permanently painful sensation against the bottom of the orbits, and along the course of the frontal sinuses. His frame was impoverished and his moral constitution much affected. After five or six months most careful attention having been bestowed upon him, and after having employed the remedies most indicated, he finally died of marasmus.

On inspecting his corpse, we found the ball of both eyes tumefied; the crystalline lens had become somewhat opaque; the internal surface of the choroid coat was of a yellowish colour, the retina disorganised (*reduite en putrilage*), the optic nerves atrophied; the periorbit and a part of the dura mater, lining the anterior fossæ of the base of the cranium, were detached, and the osseous spots, denuded of these membranes, were in a carious state. The substance of the brain was softened, and its cavities or ventricles filled with serum.

Nevertheless, on acting upon the rules laid down in the course of this memoir, by means of the prophylactic precautions which our soldiers by degrees learnt to adopt, and in consequence of their becoming acclimated, the result had been that ophthalmia became of much less frequent occurrence, and that its effects were felt scarcely any longer.

Several soldiers of our expedition, without having been attacked by ophthalmia, were suddenly struck with almost total blindness, upon the occasion of the precipitate transition from the burning climate of Africa to that of Europe, during the rigid season of winter.

It would be, therefore, a matter of great moment for the health of soldiers, not merely in this respect, but for numberless other reasons, that they should not be suffered to go from one climate to another of an opposite character, except in such seasons, when both climates have a nearly equal temperature; or if circumstances should require a departure from this rule, every necessary precaution should be taken to prevent the consequences of the extreme difference of temperature and of their pernicious tendency.

After all that we have said upon the subject of ophthalmia, it will no doubt be easily understood that, in order to be proof against it in Egypt, as well as in those countries and seasons whose atmospheric characteristics resemble those of the former, it is necessary to avoid the direct impression of light and dust upon the eyes in day-time; to be sufficiently covered from head to feet, at night, and to wear a cloth over the eyes; to keep as much as possible at a distance from damp and swampy places, and to keep up perspiration and sweating by bathing during the proper season, and by exercise. Care also should be taken to abstain from the inordinate use of wine and spirituous liquors, and from food of a heating nature and difficult digestion; to support the tone of the stomach, which in very hot climates is always easily debilitated, by means of tonics, such as coffee, and some bitter infusion, which may be taken in the morning; and finally, to wash the eyes and the whole head frequently with fresh water and vinegar.

### *Of Epilepsy.*

To the description of the diseases already given, I now propose to annex some observations which we have made on the subject of cerebral epilepsy.

Epilepsy, notwithstanding the assertion generally admitted by writers, is by no means always beyond the resources of medicine. The object most difficult of attainment, in studying this disease, is the knowledge of the nature of its exciting cause and of the organs which it affects more especially. In tracing, however, with care, the career of the symptoms which characterize the accession of an epileptic fit, it is easy enough to distinguish the principal species of this disease. That which authors designate under the name of *idiopathic* or *encephalic* epilepsy, because it has its seat in the head or spinal marrow, may be readily distinguished from that species, termed *sympathetic*, which may be seated in any other part of the body: 1, by an examination of the causes which have excited the disease; 2, by the nature and career of the symptoms which it exhibits; 3, by the pathological condition of the parts affected.

In the first place, epilepsy may be occasioned either by some defect or original malformation of the head and spinal column (being in that case, of course, of a congenital nature), or it may be the result of some pathological derangement, spontaneously developed, or produced by an external cause in the bones of the cranium, in the meninges, in the brain itself, or in the spinal marrow. Each of these lesions is characterized by particular symptoms. The first, which most frequently may be referred to hypertrophy of the bones of the cranium, manifests itself by an unnatural exuberance at several places of its surface, most usually of the vertex or superior part, as we have observed in numerous instances. There prevails in this case an habitual heaviness of the head, together with an irresistible tendency to sleep; the features of the countenance become changed, and the patient falls into a state of stupor. The fits come on in a slow and gradual manner, and always announce themselves by disturbance of the mental faculties and by loss of consciousness. They are commonly not very violent, but of long duration, and on their cessation the patients never remember any of the occurrences which have passed.

It is evident that in this variety of epilepsy it is the periphery of the brain which suffers, in consequence, of the pressure exerted upon its surface by the roof of the cranium, the cavity of which diminishes in proportion to the degree of the thickening of its parietes. The periodical return of the fits depends upon the reaction of the organs against the obstacles opposed to them; sometimes, however, there are concomitant causes by which they are occasioned.

If the disease be settled in the meninges, it will be more difficult to judge of the complaint, unless there be fungous growths upon the dura mater, which, having perforated the bones of the cranium, project through them outwards. The symptoms of this particular affection bear a great analogy to those of that species of epilepsy which results from hypertrophy of the bones of the cranium. When the fungi, after having perforated the bones, form perceptible tumours underneath the integuments of the head, nature must be suffered to

take her own course and every operation upon them should be carefully avoided.

The vertebral column likewise may sustain unnatural inflexions or incurvations to a greater or lesser extent. One of the last dorsal vertebræ may have undergone an instantaneous, a sudden or gradual displacement, and produce a corresponding change of the spinal marrow. This alteration is easily detected in this species; for just before the fit, the patient experiences a kind of shivering, attended by smart pains in the back, and immediately afterwards he sinks upon his knees, &c. The prognosis in this species of epilepsy is exceedingly discouraging, because art possesses scarcely any resources wherewith to relieve it; however, if, after having destroyed the spontaneous morbid causes in those cases in which they may exist, there remains only the mechanical cause to be overcome; such as an unnatural deviation or projection of the vertebræ; favourable results might perhaps be obtained from the application of the moxa, which so preeminently possesses the property of restoring the action of enfeebled organs, and which might also promote slowly and gradually the approximation of the separated or displaced bones, in behalf of which nature herself is incessantly engaged. The epileptic symptoms become mitigated and diminish in the same proportions, and the disease may finally disappear altogether. In all cases topical revulsives, such as the various methods of cauterization, if applied carefully and under proper precautions, change the mode of the morbific process; resolution takes place in the osseous exuberances; the brain or the spinal marrow are no longer compressed, and the equilibrium of the encephalic functions is restored. But it is of great consequence, as we have said before, to subdue in the first place the particular morbid causes, before undertaking any external application.

Epilepsy arising from a change of structure of some or more places in the brain, presents commonly remarkable anomalies, according to the seat of the disease. Thus, for example, when this happens to be on some place of the periphery of this organ, the patient first loses his consciousness, immediately after which he is seized with convulsions; the fits are violent and

follow each other in rapid succession. If, however, the injury be settled in the ventricles or at the base of the brain, the downfall of the person is the first symptom which manifests itself, and of which he, being previously aware of its approach, informs his assistants. The contractions or contortions of the limbs come on forthwith and assume more or less violence. In epileptic individuals of this degree, the features of the countenance undergo a change likewise, and they incessantly perform a series of automatic movements which are independent of the will.

After this we shall now devote a few moments to the consideration of idiopathic epilepsy which is by far the most common kind, and which depends on some mal-formation or fault of organization of the bones of the cranium, or on some pathological affection, acquired and settled at some point of their substance, either by foreign bodies, or by changes accomplished by the action of a certain virus, as the syphilitic virus, for instance. But in describing this species of affection we shall say here a few words on the means of distinguishing the symptoms of genuine epilepsy from those which may be observed in some persons capable of simulating it, and we intend to demonstrate the efficacy of several remedies employed for this disease, after the successful result obtained from their use in some analogous affections.

It is not always very easy for a physician of limited experience to distinguish correctly between these symptoms, because there are individuals who, in order to escape from the profession of arms, will be able to sustain the strongest tests, without evincing the slightest sign of pain.

I believe it will be sufficient to reflect for one moment only on the voluntary or involuntary mode of action of the animal functions, and carefully to examine the phenomena attendant on the paroxysms of the disease, in order to distinguish between true and feigned epilepsy. These phenomena may be divided into permanent signs, or signs accompanying the fit. The former are equivocal, where the disease is of recent date, as in feigned epilepsy; but where the complaint is of a chronic or hereditary nature, a train of more or less perceptible symp-

toms will become fixed and announce their presence externally, which the practitioner will at once recognise and promptly investigate.

M. Dumas, a celebrated professor of the university of Montpelier, used to consider the prolongation of the facial triangle as a constant and pathognomonic sign. Without presuming to question such an assertion, otherwise highly respectable, in my opinion, I will only indulge the remark that in order to effect a change of this kind in the contour of the face, it must be supposed that the disease had existed from the infancy of the individual, and that it had been occasioned by some organic defect in the substance of the superior maxillary bones, so as to cause the facial angle to swell out in proportionate degrees. It is, however, most usually in the bones of the cranium, in the meninges or in the brain itself that the cause of epilepsy is seated; therefore the alteration of these parts cannot exert any influence upon the conformation of the face, excepting in consequence of rachitis or of any other defect in the development of the bones composing it. That this angle should be less open in some epileptic person, may be easily understood; and it is well known that in the negro, in whom the facial angle is more acute than in the European, the powers of intellect are more obtuse also, and yet it cannot be conclusively inferred that the prolongation of this part should be a cause of epilepsy. Besides, it is an unprofitable business to look in geometrical variations of the countenance for the positive marks of a disease which we can hardly ascertain by any other bearings than those which anatomy and physiology furnish us with, and which are more or less constant.

In that species of epilepsy which engages our attention at present, and which originates in the head, the brain is directly or indirectly altered, and hence all the phenomena which characterize its fits. These are, as we have said before, a dull pain in the head, vertigo, the downfall of the person when in the erect position, change of the moral faculties, like those of the voice, of speech and of vision, the eyes become more or less distorted, and the muscles contract involuntarily and con-

vulsively. All these symptoms may be feigned, especially when the individual has been in the habit of so doing; but he cannot imitate the emission of thick and frothy saliva which is freely secreted during the fit, nor the dilatation of the pupils, independent of the will of the person.

In genuine epilepsy the pulse is calm and scarcely tremulous; in the other, on the contrary, it is agitated as well as the perspiration; the contraction of the muscles is also less simultaneous than in the real kind, and it does not depend upon the individual to distort his eyes, as is done spontaneously in the former.

Inasmuch as this disease exerts its principal influence upon the nervous system of relation, it disorders its functions and paralyses them, from which, moreover, results a decline of the moral faculties, an involuntary sinking of the superior eye-lids and an inclination of the head forwards, owing to the trifling power of contraction of its extensor muscles, which imparts a stupid look to the countenance; the walk of the individual is unsteady and staggering.

These symptoms, sometimes more and sometimes less distinct, are always present in the species of epilepsy of which we have spoken, particularly if the disease is hereditary or chronic, and no one, be he ever so little practised, can be mistaken by it.

The question now arises, whether it be possible to attack with any hope of success the organic injury of the cranium or of the membranes of the brain? I believe, yes; and the facts which I am presently going to relate confirm me in this opinion. It is on this account not necessary to regulate the fits or to fix their periodical recurrence, which besides is not always within the power of the physician, unless the epilepsy be of an accidental or sympathetic kind; but the internal exhibition or the external application of certain substances, possessing the property of dissolving the osseous or lymphatic tumours, such as swellings of the bones, exostoses, fungous growths of the membranes and their induration, may, by destroying the cause, induce the disappearance of the disease and the cessation of its effects.

The remarkable and unexampled success which I have met

with in obstinate venereal exostoses from mercurial frictions to the soles of the feet, at considerable intervals of time, from the exhibition of drinks acidulated with muriatic alcohol,\* and from blisters applied over these tumours, has induced me to think that the same remedies might be employed with similar advantage no doubt in cases of exostoses of the cranium, or in indurations of the dura mater which are usually so apt to produce and to keep up epilepsy; it is, however, not sufficient merely to try these remedies; they must be persevered in for a long time with such modifications as circumstances may require, but above all, after the virus has been destroyed, the repeated application of revulsives should be insisted upon.

The following cases will, I trust, inspire some confidence in favour of these remedies.

*First Observation.* Louis Lombardi, twenty-two years old, a grenadier in the imperial ex-guards, entered the hospital on account of two anomalous tumours upon the head, with some little fluctuation and redness of the skin. This man felt a steady pain in the parts affected, and was in a state of drowsiness and had frequent fits of epilepsy.

Both tumours being opened with a sharp instrument, we discovered an extensive carious surface on the cranium, corresponding with these small abscesses. The internal table of the bones was perforated, and the dura mater was perceived to pulsate slightly through the openings. The discharge of matter contained in the abscesses and depressing the dura mater, had relieved the patient; the epileptic fits became less frequent and were of much shorter duration; but the caries continued to go on and the symptoms became more aggravated. An epileptic fit could be reproduced at will by immediate pressure on some of the fungous growths of the dura mater, which made their appearance through the carious openings; these fungi were of proportionate size to the openings; at length the patient died on the thirtieth day after admission into the hos-

\* The new translation of the French Pharmacopœia by M. Ratier, p. 371, has the following formula for muriatic alcohol:

Take of muriatic acid, (22 degrees)	120
Alcohol, (26—30 degrees)	360
Mix and preserve for use in well secured bottles. <i>Transl.</i>	

pital. On opening his body, we discovered, in fact, two fungous tumours in the dura mater which appeared to have been produced by a cause\* similar to those which had produced the caries. Both these tumours pressed upon the brain in corresponding situations, which circumstance had occasioned the epileptic attacks.

The analogy which I have found to exist between these tumours and those which are accompanied also by caries of the bones of the cranium, which were occasioned by a well known syphilitic cause and which in several instances I have successfully treated by anti-venereals and muriatic acid, has inclined me to the belief that the fatal issue in the case of Lombardi, might have been averted by the same remedies, if they could have been employed in proper season.

*Second Observation.* Bartholomew Thevenot, a fusilier chasseur, 26 years old, came to the hospital to be cured of two enormous tumours of a scrofulous aspect which were situated on the neck and accompanied by pain in the head and by epileptic fits, to which he stated to have been subject for several years past.

The notes we took at the bedside of this soldier, in order to learn the cause of his complaint, informed us that, in 1802, he had had syphilis which he supposed had been properly treated. A gun shot wound which he had received six years later, when he was with the army in Spain, and the ball of which had struck the anterior part of the thigh, had been followed by typhus fever and hospital gangrene. About the time of the cicatrization of the wound, he suffered from violent headache which did not subside until a spontaneous purulent discharge from the ear had been established, after the fourth month of his stay in the hospitals. The discharge having been suppressed some time afterwards, he was troubled by an unpleasant ringing noise in the same ear and by deafness; he became subject to vertigo and to occasional slight fits of epilepsy. In this state he arrived in the fever wards of the

\* The patient could never give a satisfactory answer to the questions put to him in order to ascertain this cause; but there was reason to believe that it had been the result of a syphilitic virus, considering that he bore the marks of its effects.

hospital of the guards. The application of some leeches to the temples, of blisters behind the ears, and the exhibition of internal remedies, appeased these symptoms and promoted the formation of an abscess or bubo in the groin, the suppuration of which was unluckily dispersed by resolvent remedies. From this moment the epileptic attacks followed each other in rapid succession and became more violent; the glands of the neck became engorged, and two or three of them suppurated. In this condition the patient had been transferred to my own wards. Always suspicious of the presence of a syphilitic cause, I prescribed for him anti-venereal in conjunction with anti-scorfulous remedies. Fluctuation becoming evident in both these tumours, I directed the caustic potash to be applied to them. On the sloughs coming off several days afterwards, the patient was suddenly attacked in the middle of the night by a violent epileptic fit, which was succeeded by complete hemiplegia of the left side, by the almost total loss of his intellectual faculties and the use of his senses. Notwithstanding his inclination to stupor, the patient pointed to a painful spot in the hypochondriac region of the paralysed side. The application of a large blister over it relieved him momentarily, and the epileptic fits were interrupted. The hemiplegia, however, remained always the same, that is to say, the two paralysed limbs continued to be deprived of the powers of motion and of sensation. A few days later the headach returned, as well as the epileptic attacks. The patient being in imminent danger of death, I ordered the application of a blister to the head. The head being shaved, a considerable prominence was observed on its right side, which was formed by the squamous portion of the temporal and lower half of the parietal bone. Another prominence on the top of the cranium gave to the cranium a conical shape. The first blister covering the scull-cap produced a sensible improvement, after which I prescribed for him an infusion of valerian with the stimulant addition of muriatic alcohol, some boluses of camphor and opium for the night, and an anti-syphilitic liquor, one ounce to be taken every morning in milk.\* I increased

\* This liquor consists of oxymuriate of mercury, muriate of ammonia and

the dose of camphor by degrees to sixteen grains (un gramme) a day. The headach subsided, the paralysis diminished perceptibly and the fits did not return. Some new abscesses, however, having formed on the neck, I ordered the caustic potash to be applied upon the fluctuating spots of these tumours; another blister was put to the nape of the neck, and a third one over the tumour formed by the temporal bone.

Sensation and motion gradually revived in the paralysed limbs. The patient recovered daily more and more the use of his senses and intellectual faculties, but still he was periodically subject to shiverings of the left side of the body, which succeeded to a tremulous motion from the extremities to the head. This phenomenon occurred more particularly in tempestuous weather.

The suppuration of the sores of the neck having been stopped again from causes which remained unknown to me, he had a new attack of epilepsy, which, however, was of but short duration. I hastened to re-establish the suppuration of the scrofulous ulcers, and directed a fourth blister to be applied over the tumour of the temple. I increased the dose of camphor still further. All these measures produced excellent effects, and the patient made rapid progresses towards recovery; nevertheless, after a short lapse of time, several very violent attacks of epilepsy came on again, but were of shorter duration. The application of the blisters to the head was repeated, in addition to which I had put some also to his right arm.

One day during my morning visit he had a terrible fit, accompanied with convulsions and an extreme sinking of his vital powers. I directed yet an eighth blister to be applied to the temple; and in addition to the powerful anti-spasmatics which the patient was taking, I gave him bark in substance in generous wine and ether; for the blister upon the arm I substituted an issue which he has kept open.

Ever since the last mentioned fit Thevenet has not been troubled again; the paralytic affection has yielded completely, and

opium,  $\text{aa}$  10 grains, to be dissolved in the necessary quantity of Hoffman's anodyne liquor, suspended in a quart of distilled water.

he has by degrees recovered the integrity of his physical and moral functions. The sores of his scrofulo-venereal ulcers have cicatrized; the bony prominences of the cranium have disappeared and the head has regained its looks (*facies*) and its natural outlines. In fine, I believe that this soldier has been for ever released and perfectly cured of a disease which is generally considered incurable, particularly where it has reached to such a degree as in the subject of this observation.

*Third Observation.*—Dutertre, a rifleman, 44 years of age, had been for about a year subject to fits of cerebral epilepsy in frequent repetition. In consequence of a fall which he had upon the head, at the commencement of one of his latest attacks, he had ruptured the vessels of communication of the integuments of the right temporal region with the temporal apophysis, the results of which had been a sero-sanguineous effusion, inflammation and an enormous collection of matter, on account of which he had been brought to the hospital of the guards. Emollients were employed for several days, and as soon as the fluctuation of the abscess had become distinct, I opened it by making a deep incision into it: a great quantity of pus was discharged from it, and from that moment the patient felt relieved. I put him upon the use of a ptisan of valerian, in conjunction with the muriatic acid and the camphor and opium boluses, the dose of the former being gradually increased to sixteen grains a day.

The wound was cleansed and had cicatrized; the countenance of the patient, which had been already much changed at the time of his entrance into the hospital, had resumed its shape and usual expression; he has not had another attack of this disease, and, like Thevenet, has acquired even some embon-point. The abscess which had formed under the integuments, had doubtless produced the same effects in the one as the blisters in the other.

*Fourth Observation.*—Francis Picot, 24 years old, of lymphatic temperament, a private of the second regiment of infantry of the guards, had been admitted into the hospital, on October 8th 1821, on account of epileptic fits, which, for several months past, had become more frequent. His disease had

been occasioned by hypertrophy of the cranium, which might be ascertained by simply comparing the thickness of this bony cap to the stature and slender proportions of the patient; but the dull pains which he felt in the head, chiefly at its superior part, the impossibility of his bearing upon it any object of the least weight, the restraint which he felt there under the influence of pressure from the hand, of ever so short a duration, still better confirmed the existence of the morbid changes alluded to. The other symptoms of cerebral epilepsy were particularly striking in this man; decline of the mental faculties, languid eyes, the upper eye-lids involuntarily sunk, the head inclined forwards, besides which, the patient was sad and silent; his face, however, had some colour, and a serious ophthalmia of a purulent nature had manifested itself several months since.

The epilepsy of Picot was of very long standing; it had existed from eight to nine years, with intervals of a year or eighteen months between without having a single attack. Nothing of any great moment, such as concussions, wounds, falls or frights having occurred to give rise to it, the original cause, therefore, could be referred only to the repulsion of an itch, cured in three days by a village shepherd, in as much as this psoric affection is the only disease by which Picot remembers to have been attacked, and as the first epileptic fit did not happen until after the cure of the itch. Other circumstances seemed further to confirm these suspicions, for instance that from one time to another, and particularly during the hot summer months, Picot's body became covered with pimples, more numerous sometimes than at others, and disappearing again as readily as they had sprung up. These pimples occasionally caused an itching sensation; and on puncturing them there was generally nothing discharged but a little serum. In addition to this, we ought to consider that, while these eruptions continued on his body, the health of our patient was always much better, and that he was then free from fits.

Depletion from the jugular vein, cups to the temples and to both sides of the spinal column, were the measures first employed, after which the head was shaved and a large blister

applied over the surface of the base of the cranium. Notwithstanding this, he had another epileptic fit a few days afterwards; but in that there was, indeed, nothing surprising, as for the last five or six months the fits had assumed a periodical character. A partisan of acidulated barley gruel was prescribed for the patient, together with extracts of valerian, taraxacum, fumaria officinalis and a small quantity of aloes; a pill composed of camphor and nitre, in doses gradually augmented, and antispasmodic draughts were given. More cups and fresh blisters were applied to both sides of the spine, which soon afterwards were succeeded by the application of two grains of potash to the base of the cranium, the sores resulting from which were converted into issues.

Under the influence of this revulsive treatment the condition of the patient seemed to improve. At the beginning of November, having observed upon the top of the head two spots somewhat fluctuating, which could easily be depressed with the finger, it was judged proper to establish there two sloughs with the potash, for the purpose of aiding the stimulating action of the discharges at the base of the cranium; and inasmuch as by these means the well-being of the patient was so much further improved, that the ophthalmia had been considerably tranquillized, these two latter applications were soon after succeeded by a third of the same substance on some other convenient place of the top of the head.

However, on the 15th of November Picot was attacked a second time, since his admission into the hospital, which in its duration and violence was greatly reduced from the preceding ones. During the treatment of his disease symptoms of gastric derangement became developed and were allayed by diet and mild drinks. An emetic was administered likewise, and the relief obtained from it impressed us with a belief in its salutary effects under such circumstances. In fact, the revulsive measures thus uninterruptedly persevered in, restored the patient by degrees, if not to perfect health, at least to a condition very near akin to it. In December the ophthalmic disease had ceased to exist altogether; tranquil in its appearance, the eye was more at ease in its motions, the upper eye-lid

moved upwards with facility, the slight convulsive motions which had been frequently observed in the muscles of the face and limbs, were scarcely perceptible; a greater degree of cheerfulness had taken the place of the profound silence which, during the two first months, he had almost constantly observed. The cranium was evidently reduced under the influence of the inciting remedies which had been applied, for the measure taken of the different diameters of the head, on the very day of admission into the hospital, amounted then to several lines more.

In order to add still further to the results thus obtained, or with the intention, at least, not to lose any of the benefits which had accrued from them, the application of several moxas behind the ears, and below the inferior occipital protuberances was begun, in the month of December, and several mercurial frictions were directed to be made to the soles of the feet at intervals of from five to six days. As Picot was anxious to leave the hospital in the early part of January, an issue was established upon the arm, so as to supply and replace the measures which now he was about to relinquish.

Symptomatic epilepsy is occasioned by the injury of any part, foreign to the encephalon and its dependencies, or by the presence of some foreign substance introduced into the animal economy, or spontaneously developed there. Among the former rank certain lesions of nerves, of fibrous portions of articulations, of tendons or aponeuroses, &c.; to the second class belong the presence of certain calculi in the bladder, of an irregular shape, of worms in the intestines, of balls or other projectiles in various parts of the body.

The fits of these two kinds of epilepsy are always preceded by pain or shaking which arise from the seat of injury, fly afterwards to the head, and bring confusion into every function. Under such circumstances the functions of nutrition frequently participate in this derangement; the general circulation and respiration undergo likewise sensible deviations. After the true cause and seat of the complaint have been clearly ascertained, it is sufficiently easy to fulfil the indications which may present themselves.

When, after wounds from fire or side-arms, connected with extensive injury or loss of substance of the parts affected, a cicatrix should form in which some nervous filaments are included, several instances of which have come under my own notice, it will be sufficient to cauterize with the red-hot iron or with the moxa those points of nervous adhesion and to let the cicatrices slowly and gradually renew themselves. With respect to foreign bodies, whatever may be their size and nature, they should be extracted if possible, after which the fits will commonly cease, especially when the disease is not of very long standing.

In addition to the topical revulsives which are more or less efficacious and active in every species of epilepsy, the exhibition of internal remedies, bearing upon the spontaneously morbid causes which have produced, or which complicate the disease, ought not to be neglected. A weak solution of nitrate of silver, the prussic acid and other analogous substances have been latterly highly extolled; but experience has taught us that these remedies are not only incapable of dissolving the indurations of the cranium or of the meninges, the nervous adhesions or other organic changes, but that they often destroy the integrity of the mucous membranes of the intestinal canal. The narcotic poisons, as the prussic acid, aconitum, &c. attack, especially in individuals who are easily excited (impressionables), whatever may be the dose in which they are administered, the vital principle, or neutralise the nervous fluid and deprive it of its properties. The organic functions are then suspended, and the person may perish at once, as we have seen several examples of it. As to a solvent or liquefying medicine, greater advantages will be derived from the use of the muriatic alcohol given in small doses, in some appropriate vehicle; and as to an anti-spasmodic, the exhibition of camphor, gradually increased to a large dose, alone or combined with sedative substances, will best answer this purpose. Finally, the various kinds of baths, at different temperatures, will in some cases also contribute to the recovery of the patient. Habitual issues established at those places of the body which are most favourable to this disease, as well as to the occupations of the individual, are almost always requisite.

In the case of a soldier of the guards, epileptic fits had supervened after an unsuccessful operation performed at the bend of the arm, in which the cutaneus internus nerve had been pricked. At the beginning of the fits the patient experienced a smart pain at the point of the cicatrix, accompanied with a troublesome shaking which travelled along the course of the nerve, or along the inside of the arm towards the head; convulsions came on immediately, as well as all the other symptoms indicative of these fits. The application of one grain of potash to the summit of the cicatrix, and several small moxas put along the passage of the nerve, accomplished the disappearance of the fits and restored the patient to health.

## THE END.

## ERRATA.

<i>Page</i>	<i>line</i>	<i>from above, for has read had.</i>
13	1	<i>above, for and read in.</i>
22	12	<i>below, for ancient read late.</i>
27	1	<i>below, for nain read brain.</i>
60	9	<i>above, after instances dele the comma.</i>
72	1	<i>above, for ferum read ferrum.</i>
78	2	<i>above, for by this read in this.</i>
110	14	<i>below, for below read above.</i>
132	7	<i>above, for parieties read parietes.</i>
132	8	<i>below, for maneuvre read manœuvre.</i>
156	2	<i>above, for in the month of August read of the</i>
156	2	<i>below, for on read under. [same month.]</i>
178	1	<i>above, after at least dele as.</i>
203	1	<i>above, for undergoes read undergo.</i>
205	15	<i>above, after which read had.</i>
208	19	<i>below, after believe read to instead of we.</i>
209	14	<i>below, after what read had.</i>
215	16	<i>above, after measured add one metre.</i>
215	19	<i>above, after amounted to add one metre.</i>
261	11	<i>below, for supra-orbital read supra-orbital.</i>
276	8	<i>below, for sanguineolent read sanguinolent.</i>
291	2	<i>above, after restore read to it.</i>

